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Sea Otter—Past and Present

The story of an important mammal of northern seas

By M. F. MURPHY
Illustrated by R. Bruce Horsfall

WHEN the white man first came to California, wild life was abundant. Elk, deer, grizzly bear, antelope, mountain sheep and many species of upland game birds and water-fowl flourished unmolested, the vast plenitude of most species apparently undisturbed by the minor demands of the Indians. Throughout the period of exploration and settlement that followed the advent of the first whites, all wild creatures faced a scourge that swept their kind toward either numerical decimation or total extinction, tragic to contemplate. Fin, fur and feather faced death. The holocaust continued until present times, when in California, as elsewhere, the survival of a few remnants of wild life may be attributed to the sagacity of certain species or to the inaccessibility of their retreats.

How fared the sea otter on our coast? This mammal was hunted for his prized pelt so diligently that his extermination was predicted at the time of the forty-niners. Russians, prior to the arrival of gold-seekers, working south from the Aleutian Islands, had followed and persecuted this peculiar animal so relentlessly that all avenues of retreat were seemingly closed. Sea otters were the Russians' beavers of the sea, *bobry morskoi,* highly prized by their nobility and in great demand. It is probable that Russia considered the sale of Alaska to the United States in 1867 good business and good riddance. Few realize however, that the rapid depletion of sea otter herds was the obscure but principal reason underlying the relinquishment, for a mere pittance, of Alaskan claims by the Russian Empire.

After the Russian colony departed from their most southerly outpost, Fort Ross, located about one hundred miles north of San Francisco, the American fur seekers, so it was thought, during the period 1850 to 1870, administered the final *coup de grace* to the sea otter trade. Reliable records indicate that the fur trade, a highly lucrative business of earlier years, had dwindled there by 1874. Sea otters, the pursuit of which formed the backbone of the fur trade on the coast, were then so scarce that the hunters sought other means of livelihood.

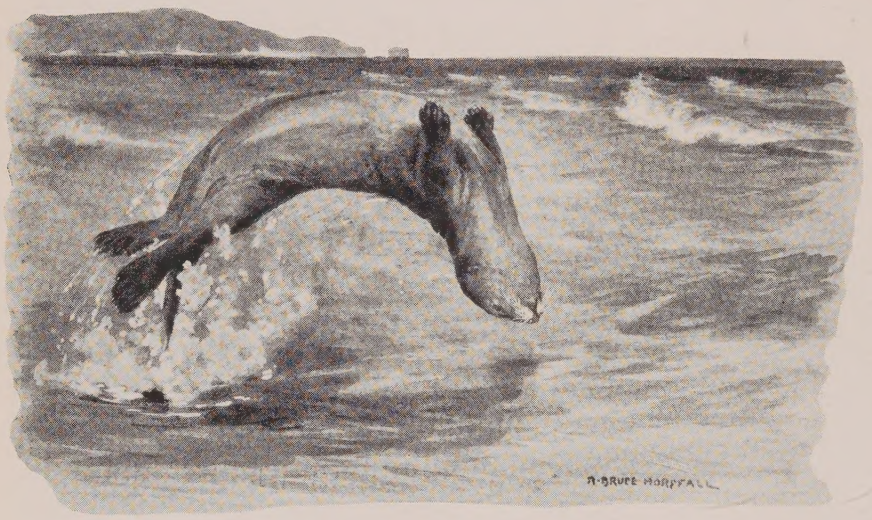
Authentic data of the eighties and nineties are far too meager, and fail to make much mention of sea otters, except perhaps to note that the animals wore excellent pelts and were, as a consequence, highly prized. During the past three decades, it was believed that the coastal region of California might still serve as a home for a few stragglers from the once great herds of this remarkable animal. If a few otters did exist, such knowledge was sheltered in mythical legend or shrouded in dark mystery. However, in 1913, the state of California passed a law giving the sea otter full protection, with severe penalty for transgression. Subsequent to the passage of this protective provision, scant information reached the general public relative to the existence of the rare sea otter in coastal waters of California, although Bailey, in 1936, ventured to say that a few might be left on the coasts of Washington and California. Interest in the life and habits of this strange animal on the part of the public was almost dormant.

The electrifying news then broke. In the spring of 1938 a thriving colony or herd of sea otters was discovered near the mouth of Bixby Creek, in Monterey County, about fifteen miles south of the town of Carmel. In a cove guarded by precipitous cliffs and headlands, and about two hundred yards off shore, unconcernedly disporting in the kelp beds that restlessly rise and fall with Pacific swells, approximately eighty members were counted. No time was lost by the writer in seeking a vantage point from which to view first hand the rare mammal that had appeared from nowhere, risen indeed as if from the dead. For many hours, which passed like so many minutes, it was the good fortune of the writer to observe them closely.

Notley's Landing is now in ruins. A few scattered

beams, shakes and scraps of metal remain to mark the spot where oak tanbark was trolleyed to waiting ships beyond rocky shores. Three hundred yards northwest of the old landing, with the aid of powerful glasses, I saw my sea otters. They had moved about a mile north of the original point of discovery. Heavy growths of kelp rose and fell in the ocean swells. This kelp has a tendency to calm rough waters, so dense is the mass. A certain type, known as sea otters' cabbage, has a bulbous head, or bladder, usually crowned with a bunch of ribbon-like banners. The bulbs or cabbages are yellowish-brown. Sea otter heads are yellowish-brown, and the two are similarly shaped. Together cabbages and heads rise and fall with the ever present swells. No better example of camouflage exists. Protective coloration, movement and outline are remarkably similar. Keen vision is necessary to spot the otters and as a consequence, satisfactory photographic results are extremely difficult to obtain.

Through cresting wave and surging swell sea otters scoot like seals. Porpoise-like they leap clear of the water, roll round and round, flip water in the eyes of playmates, simulate biting and rough one another about. They are charged with boundless energy and may be listed with the most active marine creatures that live. Rest periods—and how otters do relax at recess time—are spent floating along, as it were, belly up, the stubby front and rear legs continuously pawing at the air. The sea otter at rest resembles a human infant reclining on its back in a crib, fingering the mysterious toes. Asleep, they appear like bloated gunnysacks of utter shapelessness. To provide indolent buoyancy as the animals sleep, much air is probably retained in the lungs. At play, one never ceases to smile at the clownish mannerisms of these quadrupeds, or marvel at their complete mastery of a habitat that should be the home only of creatures possessed of fin or flipper.



"PORPOISE-LIKE THEY LEAP CLEAR OF THE WATER, ROLL ROUND AND ROUND, FLIP WATER IN THE EYES OF PLAYMATES, SIMULATE BITING AND ROUGH ONE ANOTHER ABOUT."

Whosoever learned to swim at a tender age will be captivated by the antics of sea otters. The man, who as a boy, dove, fetched, treaded, "chawed beef" and floated about in the old swimming hole, will be fascinated by the activities of these animals. Active participation in the rough game of water polo is the nearest that man can approach to a simulation of the riotous antics in which these bearers of such choice pelts indulge. They do everything man can do in the water and more, so much more. The land otter is noted for his mastery of fresh waters, but the sea otter fears not the briny curling breaker or smack of dashing spray. He laughs at the storm gods.

Unlike the seal, the rear legs of the swimming otter do not execute the true flipper movement. There is no intermittent side thrust and glide. Flipper-like in appearance the rear legs may be, and they are carried listlessly as such when the animal is at rest, but when action is demanded, either in search of food or to escape from danger, the otter turns belly down and the rear legs move vertically at right angles to the body. The movements are rapid or slow as occasion demands. The arcs then described, as legs are forced directly backward, are very similar to those employed by the arms of the human crawl swimmer. Human hands with fingers pressed closely together are cupped for the power thrust, but the sea otter spreads the toes of his hind feet as far apart as possible and large webbed scoops result. Excellent pushing propelling members are therefore provided, the possession of which any swimmer might envy. The follow-through is duck-like, fascinating to see and provides remarkable power. The recovery is of course completed entirely under water. Action of the front legs as the animal swims about is identical, but the chief functions of these two limbs are to provide balance and rhythm with resultant grace.

Sea otters are very gregarious, in that they exemplify the highest ideals of the "happy family". Occasionally a few reckless ones detach themselves from the main herd and play or seek food within even twenty-five yards of shore. To watch them then is a great privilege, one which indeed affords rare opportunities for study and entertainment. To one interested in details of sea otter life, and if opportunity presents, it is suggested that efforts be made to observe the creatures from the steep cliffs that abound near their home. It is remarkable how near one may approach their playgrounds, provided the stalk is carefully performed. There seems to be little danger of a sudden departure to other and remote feeding grounds, if they are unmolested by human vandals.

In North America, sea otters, according to authoritative information now available, once ranged from the Aleutian Islands to Baja California. It is recorded that the Kurile Islands north of Japan were favorite hunting grounds for early sea otter hunters. Thousands of pelts

"ASLEEP, SEA OTTERS APPEAR TO BE BLOATED GUNNYSACKS OF UTTER SHAPELESSNESS"

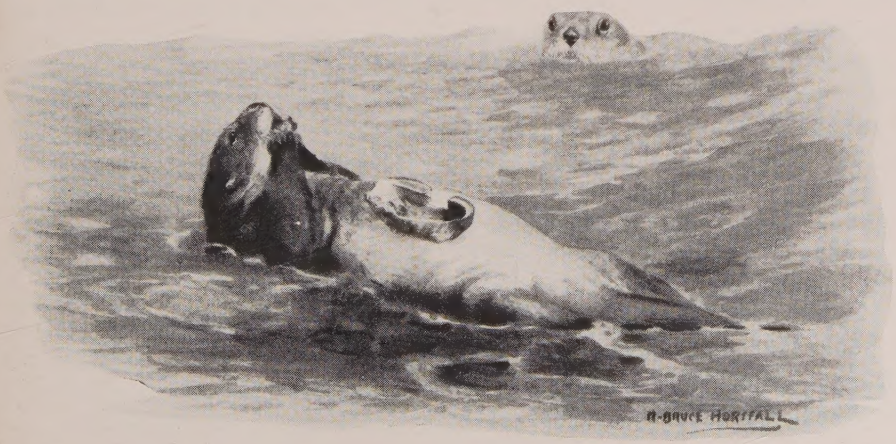
were gathered yearly. From 1799 to 1802, more than 12,000 furs reached Canton, China. Russians alone killed 15,000 annually for a period of five years and authentic record exists of the sailing of Baranof from Alaska in 1804, with a cargo of 15,000 units. What matter if spoilage ruined a portion of the shipment, or if such portion was crudely prepared and poorly handled in slow transit of the times? Standard price tags of early days are not available, but in 1870, an otter pelt was worth $50. Ten years later, pelts were worth from $100 to $150 each. In 1910, the London price was $1700. During the year 1916, when but single individuals were rarely sighted, sea otter pelts commanded fancy prices ranging from $1500 to $2000 each.

The full grown sea otter may reach five feet in length. This dimension includes the blunt ten-inch tail. The animal possesses full, black piercing eyes, set in a head resembling closely that of the fur seal. The ears are less than one inch in length, erect, pointed and covered with short hair. The fur is silvery-brown superficially, sprinkled with long glistening hairs that extend beyond the main nap of the coat. The inner coat is liver brown, almost black and of very dense texture. Sea otter fur is very durable. The beauty and richness of the pelt are most exquisite, and defy accurate description.

It must be emphasized that rarity alone has not boosted the price of sea otter fur. In the matter of comparison: nobility may demand ermine, the wealthy may seek the perishable chinchilla, but the coat of the sea otter far surpasses these and all other fur-bearers. He was clothed by Nature with surpassing pelage to offset rigorous conditions of wave, wind and chilly ocean waters. All members of the weasel family are fortified with lustrous and sturdy encasements and the sea otter is no exception. When the creatures were numerous, many of the early fur seekers considered the coat of the sea otter the finest of all furs. Contrary to modern methods of marketing with many a subterfuge in handling, there was never a time when dyes were needed to falsify, or application of spurious name necessary to increase, sales of sea otter fur. The demand for the coats of *bobry morskoi* was great even during earlier times and only simple preparation for the art of the furriers was required.

The sea otter seems to have no definite mating season and the pups are brought forth on the kelp. One authority has set the period of gestation at from eight to nine months. This statement may be regarded only as approximate, so difficult it is to observe such intimate characteristics. A single pup is usually born, but mothers with twins have been sighted. The birth of more than two pups is unknown. It was generally believed by hunters that sea otters mated for life, but here again there is no positive proof to substantiate the early fur seekers' assurance. Attempts have been made to make pets of captured sea otter young, but all have ended in failure. The captives refused to take nourishment and perished. The mothers caress and suckle their young with much affection, uttering the while a soft plaintive cry. Otter hunters often claimed that the female sang her offspring to sleep.

The rear feet of the sea otter are webbed and armed with five sharp claws. The front feet are similarly equipped, and the legs, both front and rear, are short to the point of being ridiculous. The peculiar habit of apparently shading the eyes with the front paw from the glare of the sun is especially noticeable. Being very gregarious, the animals have a marked tendency to collect in herds of fifty to hundreds. The power of scent is remarkably developed, but this sea-going quadruped is as curious as the antelope. The food of sea otters consists of



"THE SEA OTTER AT REST RESEMBLES A HUMAN INFANT RECLINING ON ITS BACK IN A CRIB . . ."

clams, crabs and other marine invertebrates. Small rock cod and other fish are also eaten, but the sea urchin is the prized food morsel. When food is brought up, the creature turns over on his back and dines at leisure, using the front paws in the same manner as the raccoon. Bits of food are tossed into the air and recovered with the paws or mouth, for the sea otter must eat and play at the same time.

The Indians obtained their otter pelts by spearing, or through the use of darts, as the animals slept. They were also netted and clubbed, but the most deadly method of capture was employed when the otters were followed in boats by Americans and Russians and killed with rifles. A special otter canoe, adaptable to surf and rough sea, was used. When a large herd was sighted, eight to twelve otters were dispatched before the main herd dispersed. Sea otters were also shot from shore, but whether killed from boat or shore, the bobbing head presented a difficult target to the rifleman. When alarmed, the sea otter rose half length from the water and, if danger threatened, immediately submerged. The under-water swim probably averaged forty yards. The mothers grasped the young with the mouth and dove. The pups wailed protest of the all too frequent duckings as the frantic parent sought, by means of repeated dives, to escape with her prized darling. It is not difficult to picture the piteous efforts of the female sea otter diving again and again to escape the cruel persecutors.

Sea otter hunters have noted that, if mortally wounded or killed outright, the animal, without appreciable surface struggle, sank immediately toward the bottom. Kanakas, noted for proficiency in water, were often kidnapped from the Sandwich Islands by the whites, to retrieve the submerging carcasses. The sea otter being an expert diver, it is therefore reasonable to assume that his last act for prolongation of life would naturally be an instinctive movement toward the depths that never failed to shelter him when danger threatened.

Kelp beds, which otters must frequent for food and shelter, occur frequently from Monterey to San Luis Obispo, a distance of approximately one hundred miles. A fine expanse of this marine growth is present in the cove of Big Creek, just north of Gamboa Point. It is possible that another colony may be discovered by sharp-seeing eyes in this, or some other mass that mats a coastal indentation somewhere along the vast coast line that stretches from Baja California to the Aleutians. A recent otter census, conducted by the Department of Natural Resources of California, reveals a number that approaches 300. The shore waters of Monterey and San Luis Obispo counties produced this surprising result. North of San Francisco Bay, sea otters' cabbage heads bob about in the coastal regions of Sonoma and Mendocino counties. The possible discovery of the "sea beaver" near the mouth of the Russian River, old Fort Ross, or Point Arena, would bring joy to the heart of any lover of our disappearing wildlife.

An elusive atmosphere hovers over the historical background of the Golden State, wherein the sea otter has carved for himself a secluded but imperishable niche. Although printed pages fail to allot justifiable space to this fur-bearer, his influence on historical events of the entire west coast of North America was very important. What favors of fair lady won, what drownings, killings, tragedies and scandals, each interwoven with the sea otter fur trade—all but one are unrecorded. Considered among the greatest romances of all time, tragic enough to inspire the pen of Bret Harte, the love tale of Count Nickolai Rezanof and the lovely Spanish maiden "Concha" (Dona Concepcion Argüello) ranks as a classic, often retold, and based entirely on fact. Were it not for the merciless pursuit of the sea otter, these two would never have met.

It is fitting that the sea otter has chosen as a threshold the vicinity of Monterey for his stealthy return to the home of his ancestors. The town and its environs reek with romance and tradition. Peace now reigns where Padre Junipero Serra sleeps, and the cypresses of Point Lobos have taken on a deeper mossy green. Fogs creep silently over artichoke fields of the Carmel Valley, and the redwoods of Palo Colorado murmur a welcome in their lofty fronds. Vantana Cone and Pico Blanco rejoice from rugged summits. The clan of *bobry morskoi* has come home.

Now that a happy and healthy colony of rare sea otters has reappeared, it should be the aim of all lovers of wildlife to cherish and protect from ever-threatening extinction this or any other remnant of the great herds that formerly splashed about in the blue-green waters of the Pacific. The discharge of firearms within sound distance of Notley's Landing should be prohibited and nothing should be left undone to encourage increase in any sea otter herd now existent. No one will doubt, from an esthetic standpoint alone, that the pursuance of a normal life by the rare sea otter is of great moment, and concerns all. Regardless of the huge price his pelt may bring, complete destruction of his kind because of personal greed or desire for selfish adornment would surely be tragic. Wanton waste and unbridled killer instinct have wrought far too many deplorable calamities to our wildlife resources in the past. Conservationists should all rise and chorus, "Long live the sea otters—the Russians' sea beavers—*bobry morskoi!*"

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Sequel

By OSCAR OSTLUND

The shooting is over, and, as the hunters go,
Clouds open, quietly, and rain begins to pour;
Clean water falls on ridges, stained by gore;
A mild rain laves the burning wounds of doe.

A SHORT VISIT WITH MR. AND MRS. PLUMBEOUS B. GNATCATCHER

By LAURENCE M. HUEY

Photographs by the Author

It was on a calm bright sunny morning in late April. I was slowly searching through the low desert shrubbery on the northeastern face of Crossman Peak in the Chemehuevis Mountains of central western Arizona, my objective the nest of a desert sparrow.

A Scott oriole was serenading his mate with a clear musical song from his favorite perch atop a yucca on the ridge. Nearby a pair of Mearns gilded flickers and a cactus wren announced their presence with their different songs. The air was vibrant with the desert spring season.

Several pairs of black-throated desert sparrows and a pair of canyon towhees were known to be living in this particular section, although they seemed unwilling, at the moment, to let me in on the secret of their home sites. Also, as seems always to be the case with such quests, the more diligently I searched, the more silent were the sparrows. They seemed to sense that they were the object of pursuit, although my objective meant them no harm.

Suddenly I heard the "*chee-chee*" scolding of a plumbeous black-tailed gnatcatcher. I had invaded his territory; he resented it and did not mind saying so. He was a tiny fellow with a glossy black cap on his head. His white-bordered eyelids stood out in bold contrast to his slate-blue back and black head dress. This black cap is the nuptial bonnet of the males of the black-tailed gnatcatchers and is worn by them only in springtime.

To say the bird was shy would be untrue, but he was tiny and could flit through the brush like a mystic elf. So well did his color of drab slaty-blue protect him in the bright shadows, as he journeyed through the rather open brush, that often I lost sight of him, even with the brilliant desert light to favor me.

After his first excited alarm, at the moment of our meeting, he led me, almost in a direct line for nearly fifty

FATHER TAKES HIS TURN AT THE NEST, AND ALWAYS WITH A PRELIMINARY FLOURISH

yards, to his dainty little nest of shredded plant fibre adorned with bits of white silk web of spider egg sacs.

The beautiful cradle was nestled in the small branches of a squaw tea bush about two and one-half feet above the ground, and in a rather exposed position on the southeast side of the shrub. It was ideally situated for photographing, and Mrs. Gnatcatcher was at home too. She seemed loath to leave her treasures, and did so only when my hand was within an inch of her back. Four small, bluish, dotted eggs lay in the bottom of the deeply-cupped nest. Fine speckling covered the entire surface of the tiny elliptical eggs, but this was heavier on the larger ends and gave them a wreathed appearance. Close examination revealed the eggs to be near the point of hatching. Both birds were extremely perturbed about my presence, "*chee-cheeing*" loudly as long as I was near.

I had moved away only a step or two when Mr. Gnatcatcher popped on the nest. Incubation was the business of the day and it was his turn, visitors or no visitors.

Studying the photographic possibilities carefully, I decided that mid-morning light was best, so I marked the spot and made definite plans to return with proper equipment at the right time. The next day I approached the nest with some trepidation. Suppose—but my fears were soon allayed, for little Mrs. was at home and no harm had befallen the diminutive pair during the night. Often I have found that wandering enemies will follow the human trail and so discover nests that have been examined, and left for a future visit.

With my camera about six feet from the nest, I focused it, stretched a thread back to a vantage point, inserted a film holder, and left to take my place and await the incubating bird's return. She had left the nest when I began setting up the machine.

When several yards away I looked back at the nest. Behold, there sat the Mrs. smugly at home and looking right at the lens. I gently pulled the thread, the shutter clicked loudly, but she would not leave the nest again. She had duties at home. Even when I carefully went to the camera, replaced the slide and turned the film holder over, making several sharp clicking noises in doing so, this did not frighten her from her nest. Here was the chance of a lifetime. I made four pictures, and then decided that perhaps Mr. and Mrs. Gnatcatcher would stand for some real gnatcatcher portrait studies. So the camera was moved up to a position three and one-half feet from the nest. The subject almost filled the plate, I was so close to the birds.

THE FEMALE SEEMED, WHEN APPROACHING THE NEST, ALWAYS TO HOLD HER TAIL IN A VERTICAL POSITION

The birds *"chee-cheed"* about this move for a minute or two, then Mr. Gnatcatcher took over the setting job with an air of bravado, as if to show his lady that he wasn't afraid. I decided not to go far away either, and sat down back of the tripod and made my pictures with a three-foot piece of thread.

For the next couple of hours I watched every move they made. The regularity of time that each bird spent incubating and foraging was remarkable. During this session I clocked them, and in a shorter period, two days later, the same program prevailed.

In some habits the two birds were quite dissimilar, in others much alike. The male bird always came to the nest by way of a nearby bush that was slightly taller than the one that held the nest. He proclaimed himself with a thin *"chee chee"* song from an elevated twig. He would then drop down to the nest, perch a moment near it, salute the female with song as if to say, "Here am I, now you may go." She needed no more coaxing and always departed without further ceremony. Both birds, when they left the nest, almost without exception flew directly away.

Her return was unheralded, she simply hopped up from the lower part of the nest bush and looked the situation over from a certain twig near the nest. Never a sound of greeting! That look seemed to have some positive command, for Mr. Gnatcatcher always relinquished the post without delay or argument. On two occasions Mr. Gnatcatcher, during his forage period, returned to inspect the underside of the nest. It was his duty to keep the home in repair. There seemed to be something wrong with the bottom and he was trying to mend it. This was probably caused by the hulking human intruder when he removed a small branch that was casting a slender shadow across the nest. Once the male brought in a prize spider nest and with much vocal announcing he placed it on the outer side of the structure.

The male bird always incubated longer periods than did the female. This gave her more time to feed, thus building up her strength after her effort of laying the clutch of eggs. His longest time away from the incubating job was twenty-five minutes and the shortest was seventeen, while the greatest length of time spent away from the nest by the female was forty-five minutes and her shortest was twenty. However, the least disturbance near the nest always brought the feeding bird back quickly, neither of them ever being beyond sight or hearing of home. They were without question the most devoted pair of birds I had ever seen.

The actions of both birds when on the nest were alike. After settling their tiny, fluffy, feathered bodies into the deeply-cupped structure, they would thrust vigorously with their feet, using them alternately. This act seemed to be the regular way of turning the eggs, and would be performed by each bird as soon as it took over the nest. Often, after a few minutes of close setting, the incubating bird would grasp the sides of the nest with its feet, rise and turn the eggs with its beak, but this was not always so.

A week after I had spent these pleasant hours with the gnatcatchers, and the day before my party moved, I returned to spend one last hour with my tiny friends. Four black-skinned, almost naked young were in the little nest, and a busier pair of parent birds I had never seen. They didn't appear to notice my presence but kept hunting food for their hungry young. As when incubating, the male came in with his squeaky song despite his beak being full of insects for his offspring, and the female still was silent when she came in with her burden of food.

Ill fared the moth that chanced to cross their path, for as I came up I happened to flush a small slow-flying one from a bush nearby. Immediately it was set upon by the male gnatcatcher and captured in mid-air.

This last hour was all too fleeting, and it was with reluctance that I bade farewell to this most interesting pair of gnatcatchers. As I left them, serenely happy on that desert mountain-side, I made for them a silent wish that they raise a grown-up family, Nature's crown of glory.

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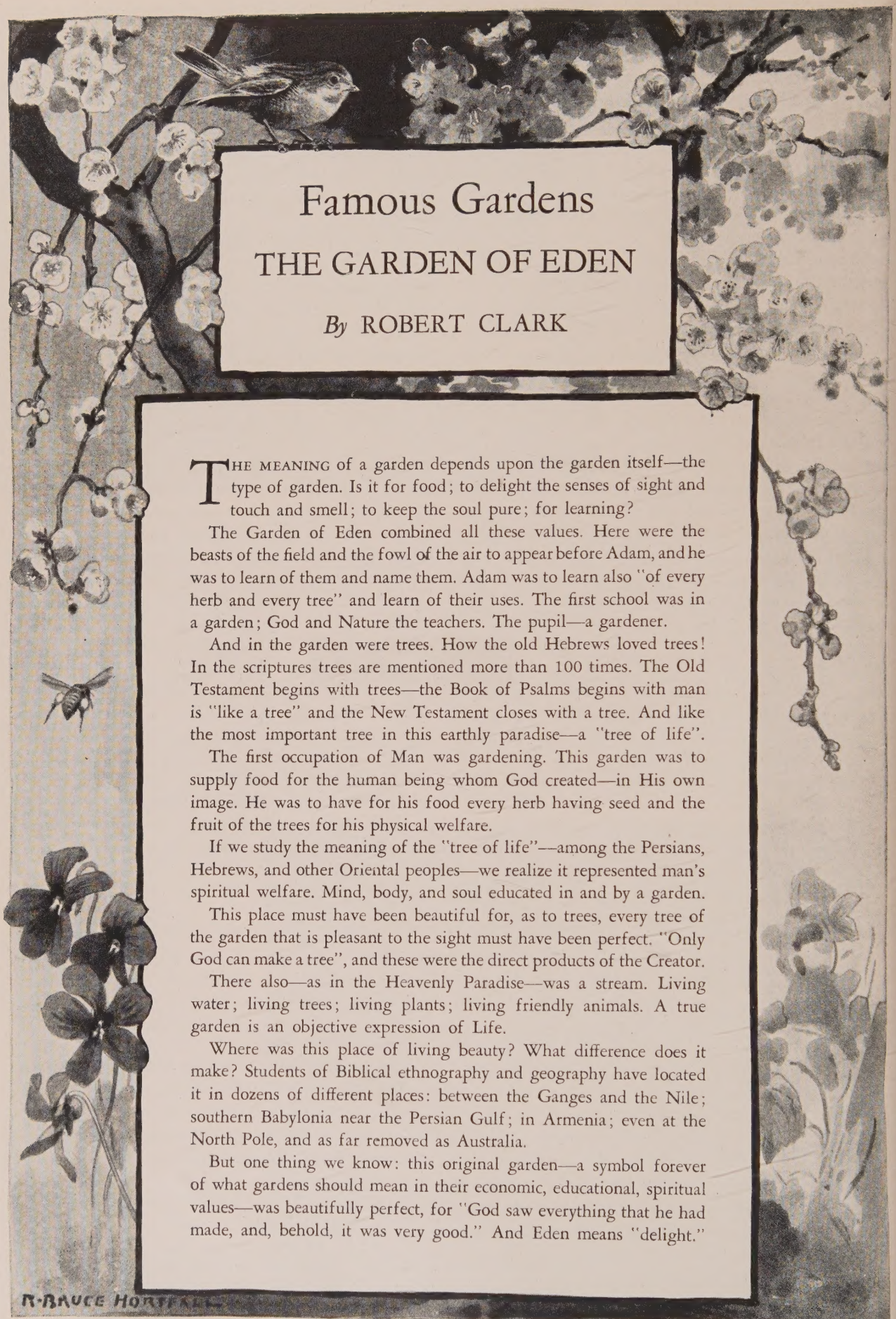
To A Mocking Bird

By PATIENCE MARSHALL LEAVER

When I hear you, Minstrel, singing,
When I hear you, Minstrel, flinging
Golden arias across a silvered world;
From a newly-blossomed bower,
In your matchless music shower,
Wistful, gay, or wild with rapture,
Each bird's song you here recapture
With an art above all learning,
Sprite with love and beauty burning.

When I hear you, Minstrel, singing,
When I hear you, Minstrel, flinging
Song enchantments, leaving ebon night impearled,
From a city tree, that's lonely,
Spendthrift there for men who only
Know of unimpassioned hours
In a maze of stony towers;

When no more the traffic thunder
Dims your caroling, I wonder
Do you show that joyous graces
Reckon not with times nor places?
Or is yours a heart that pities
Folk who cannot fly from cities?



Famous Gardens

THE GARDEN OF EDEN

By ROBERT CLARK

THE MEANING of a garden depends upon the garden itself—the type of garden. Is it for food; to delight the senses of sight and touch and smell; to keep the soul pure; for learning?

The Garden of Eden combined all these values. Here were the beasts of the field and the fowl of the air to appear before Adam, and he was to learn of them and name them. Adam was to learn also "of every herb and every tree" and learn of their uses. The first school was in a garden; God and Nature the teachers. The pupil—a gardener.

And in the garden were trees. How the old Hebrews loved trees! In the scriptures trees are mentioned more than 100 times. The Old Testament begins with trees—the Book of Psalms begins with man is "like a tree" and the New Testament closes with a tree. And like the most important tree in this earthly paradise—a "tree of life".

The first occupation of Man was gardening. This garden was to supply food for the human being whom God created—in His own image. He was to have for his food every herb having seed and the fruit of the trees for his physical welfare.

If we study the meaning of the "tree of life"—among the Persians, Hebrews, and other Oriental peoples—we realize it represented man's spiritual welfare. Mind, body, and soul educated in and by a garden.

This place must have been beautiful for, as to trees, every tree of the garden that is pleasant to the sight must have been perfect. "Only God can make a tree", and these were the direct products of the Creator.

There also—as in the Heavenly Paradise—was a stream. Living water; living trees; living plants; living friendly animals. A true garden is an objective expression of Life.

Where was this place of living beauty? What difference does it make? Students of Biblical ethnography and geography have located it in dozens of different places: between the Ganges and the Nile; southern Babylonia near the Persian Gulf; in Armenia; even at the North Pole, and as far removed as Australia.

But one thing we know: this original garden—a symbol forever of what gardens should mean in their economic, educational, spiritual values—was beautifully perfect, for "God saw everything that he had made, and, behold, it was very good." And Eden means "delight."

R. BRUCE HORSFALL

PHOTOGRAPHS BY GEORGE C. MASON

THE FRIENDLY TRAIL THROUGH THE "DESERT"

Dogwood blossoms and the needles of loblolly pine brushed the windows of the automobile as one drove slowly over the road that did not pretend to be a road but a wilderness trail

To the Rescue of the "Desert"

Popular sentiment saves Virginia seashore wilderness

By EUGENE R. GUILD

SOME centuries ago, when the Atlantic Coast was advancing, a series of sand spits and dunes began to appear on the southern shore of the entrance to Chesapeake Bay. Line after line they advanced, as the sea receded, until a cape was formed—Cape Henry, it is now called.

As each new series of dunes was formed on the beach, those behind it became covered, first with beach grasses, then with bayberry and *Baccharis,* and finally with trees. As the cape reached its greatest seaward extent and then started to retreat, under the onslaught of the sea, a great dune, thrown up by the wind on its shore, started a slow march inland. Between this great curved sand hill and the shallow bays behind the cape, sheltered from gales from the sea as well as wintry blasts from the north and west, a wilderness grew up—a deep and quiet wilderness that has been known to Virginians since the time of George Washington as the "Desert".

In it are dark brown pools peopled with gnome-like knees of cypress. On the sand ridges are venerable oaks, hickories, beeches, gums and loblolly pines, bearded with Spanish moss. Because of its sheltered position, and also because it is surrounded by the tempering waters of the bay and sea, the climate of the Desert is that of lands far to the south. Humid and hot in summer, mild and quiet in winter, the Desert has brought forth an exotic flora. It is the winter home of many birds that usually do not stop, in their southern migration, at that latitude.

Orchids are plentiful; even one tropical epiphyte, a tree orchid, is to be found here. There are species of red-berried greenbrier that few people have seen, and the tree *Osmanthus americana,* sometimes called devil-tree, hitherto listed as not occurring north of Hatteras, makes its home here. There are many more to delight the botanizer.

The dense undercover provides food and nesting sites for an abundant bird life. It is here that local ornithologists journey to see the shy prothonotary warbler, and the hooded warbler. In addition to the small species, there are some large birds. A pair of great bald eagles make their home here the year around. In the tops of the trees may be seen the snowy egret and the Louisiana heron, as well as other species of this group. The wood duck, our beautiful tree-nesting swimmer, is at home. Even the brown pelican has been seen here on occasion.

The Desert, then, has been a mecca for botanists, ornithologists and Nature lovers in general from all parts of the country. In Tidewater, it has been for a century the familiar tramping ground for those with the seeing eye and the understanding heart, and the Tidewater women in particular looked upon it as a last small sample of Nature

SPANISH MOSS HANGS FROM THE TREES

Casual visitors saw no charm in the place because you couldn't see the forest for the trees

that was their charge to protect.

Through it for some four miles there wandered a pair of wheel tracks—wheel tracks in the pine needles and through the sand, with grasses and sometimes small plants growing between the treads. It was not a road, it was just a friendly trail. It had many friends who came as often as they could and drove through slowly, with many stops to see and hear what new things the trail had to offer each time.

The trail twisted and turned, and beyond each turn there was always a fresh surprise. It climbed over the forested, ancient beach ridges without ceremony or benefit of calculated gradient. Here and there were roots and tussocks that made for slow and considered driving. Ferns brushed the tires and dogwood blossoms reached into the windows. It was a friendly trail.

But there were some unbelievers, too, who travelled the trail. They grumbled because of its roughness and complained that there was nothing extraordinary to see. But they missed the very things the trail tried to give them. They wanted to go faster than the trail went. They wanted speed and smoothness, when all the trail had to offer was a tranquil, leisurely pair of ruts that never pretended to be a road, but nevertheless were a joy and delight to every Nature lover who had ever followed them.

Then the State took over the Desert, because scientists had called attention to its unique biological significance and had given it widespread fame. This, thought the friends of the Desert, was fine. Now there could be no exploitation, and Nature would be preserved unspoiled. They pooh-poohed the possibility that state officials might mistake biological significance for tourist-attraction value.

But they had not reckoned with Government "Conservation", with hordes of CCC boys, engineers, landscape architects, all eager to open up, clean up, rearrange and *denature* any area into which they could get their rakes and brushhooks. Nor had they counted on park experts to whom "park" meant one of two things: one, an area to be landscaped into the semblance of a cemetery; or, two, a site for picnic grounds, tourist cabins and trailer lots.

So the Desert was incorporated willy-nilly into the Seashore State Park, whose main function was sports recreation—bathing, boating, fishing and picnicking on the bay front. The Desert was advertised as an added attraction. Admission was charged, and a long line of tourist cars was shunted into the trail at twenty to fifty cents per car. The bewildered

FOOTPATHS WERE "ENGINEERED"

Trampers may now march in a column of squads. The "untidy" cover and shelter for birds was carefully landscaped away. Photograph by Borjes

tourist, neither knowing nor caring what a prothonotary warbler was, nor what *Smilax walteri* looked like, drove the four miles at a snail's pace. His fenders were a foot from those of other tourists behind and in front of him. There was heat, there were fumes and dust, and nothing to look at except woods that looked to him like any other woods, except you couldn't see it very well because of the trees. To him biologic significance was a headache; ecological relations a total loss.

To the rescue came the National Park Service and the CCC, with a thousand dollars' worth a day of potential labor. A "proper" motor parkway should be built, two lanes wide, with the slovenly brush cut back seventy-five feet on each side, and the ground graded and planted to flowers —beds of flowers that a person could really see, not just a patch of ragged wild flowers here and there. So the park was closed and the work begun.

THE BAGGY KNEES OF CYPRESS WERE CLEANED
A man in a boat was employed to "improve on" Nature by removing plant material from them

There was consternation among the women of Tidewater Virginia. What of the destruction of cover and food, the disturbance of ecological conditions for hundreds of yards on each side of the ravaged Friendly Trail? What of the spoiling of this wilderness for the Nature lover? Finally, what good would it do the tourist anyway—biological interest not being a synonym for sensational scenic value.

There was a rallying of groups of women in Norfolk and the old county of Princess Anne. A protest meeting was hastily organized by the Garden Club of Norfolk and others nearby. State Park officials attended, and stated that the great touring public must be accommodated with smoothly-working traffic roads, but that there was no greater lover of Nature than the Park Department, and that not one twig or blade of grass would be disturbed—unnecessarily. But underneath it all there was evident the usual, thinly disguised feeling that the members of Nature organizations were merely sentimentalists standing in the way of progress. Then, too, officials privately feared that if the road and clean-up project did not go through, keeping the CCC busy, the camp would be withdrawn.

Once out of the meeting, and with the women apparently pacified, the Park Department went back to the Desert, and laying aside its cloak of naturalist, went to work with falling axe, crosscut saw and bulldozer. The Desert resounded to the cry of "Timber-r-r-r" and the solid "thwack" of axes biting into dogwood trunks. Scores of shovels stripped the carefully hoarded woods litter from banks. Portions of the Friendly Trail were slashed open to the sky.

So began the ravishing of the beloved Desert.

But the women had not relaxed their vigilance. Despite locked gates and "No Admittance" signs, they went into the Desert. They found workers felling the rare *Osmanthus,* others raking up the distinctive carpet of partridge-berry, which the park officials spoke of as weeds, and the Friendly Trail being turned into something that looked like a railroad right of way.

This time the women of Tidewater Virginia banded solidly together and asked the State Conservation Commission to halt proceedings until the facts could be brought to light. And they spread the news of the plight of the Desert far and wide. Now came help from all over the country. Arthur Newton Pack, president of the American Nature Association, entered a strong plea with the Conservation Commission that the intrinsic value of the Desert be preserved. Robert Cushman Murphy, president of the National Association of Audubon Societies, wired a protest, terming "the so-called improvement of the Desert" a "destructive trend toward the commonplace".

Protests also came from officers of the National and the Virginia Wildlife Federations, from the Director of the Gray Herbarium at Harvard, and from the Virginia Society of Ornithology. Dean Ivey Lewis of the University of Virginia and Dr. Edgar T. Wherry of the University of Pennsylvania added their voices.

Telegrams poured in from other sources, including the Virginia Academy of Science, the Emergency Conservation Committee, the Wild Flower Preservation Society and the American Nature Study Society. The conservation-minded press—Norfolk *Virginian-Pilot, Ledger Dispatch,* Richmond *Times Dispatch, Virginia Beach News,*—all swung their editorial influence to the aid of the Desert.

On the ground, the Garden Club of Norfolk was in command, and formed a general staff of members of women's organizations of Tidewater Virginia. Resolutions of protest and willing workers arrived from the women's clubs, from the Norfolk Association of University Women, the Junior League, the Society of Arts, and other representative organizations. The women were mobilizing to stop the ravishing of Desert, and stop it they did, as thoroughly aroused citizens usually are able to do.

A change in the conservation administration of Virginia came at this time, with the appointment of a new Conservation Commission chairman and a new State Parks Director. The newly-constituted commission held a hearing on the matter in April, inviting the women to appear and present their case. The case was presented and it fell upon sympathetic ears. The Conservation Commission, with the evidence presented by the committee of women and the counsel of the many protesting organizations, handed down a verdict for the Desert and for the devoted women of Tidewater and their Nature preservation allies throughout the country.

The cutting, raking, and denaturing was stopped. The Friendly Trail was to be restored as far as possible. The last vestiges of American wilderness areas retreating toward extinction are, at Cape Henry at least, reprieved.

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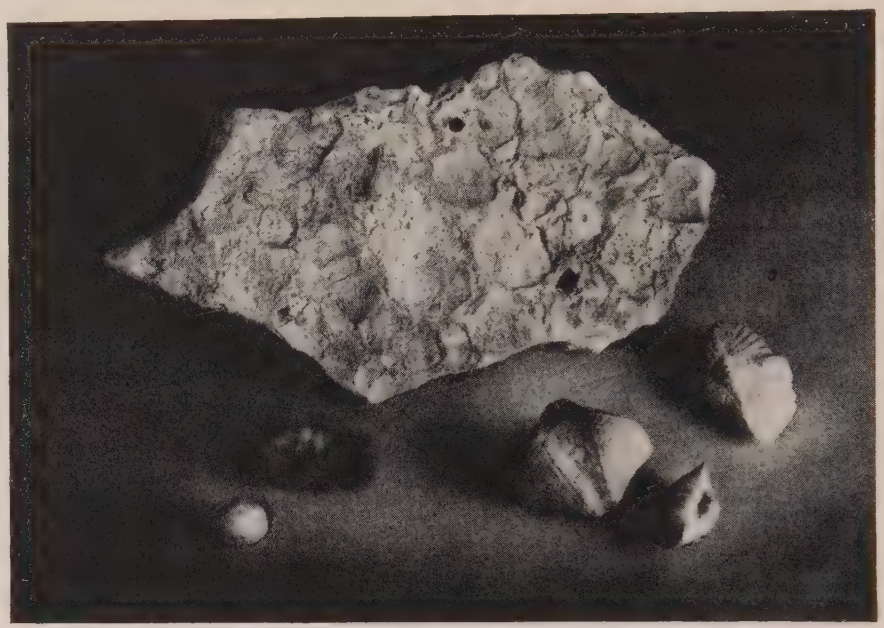
LAMP SHELLS

By C. S. GWYNNE

COLLECTING recent shells is fascinating, and, with some, a life-long hobby. Collecting fossil shells is even more fascinating to some people.

The fossil shells illustrated here were the protective coverings of animals that lived in the sea many, many years ago. Each specimen is really a pair of shells. If you look closely at the two specimens at the lower right you will see the hinge along which the shells could be opened and closed.



PHOTOGRAPH BY MARGARET BOURNE FOX

INDIVIDUAL LAMP SHELLS AND IMPRINTS IN ROCK
The single shell turned up like a saucer is one side of a brachiopod, so shown to illustrate the reason for the name, lamp shell

These shells are sometimes called lamp shells because the saucer-like shape of a single shell resembles a Roman lamp, a shallow dish holding oil, in which a wick was laid. They are also called butterflies or butterfly shells because, when the shells are opened, they look much like butterflies with wings spread. Brachiopod is the name applied by scientists to the animal and its shell covering.

The word brachiopod is derived from the Latin word meaning arm and the Greek word meaning foot. This term is used because the animal moved along by means of an arm-like extension that served as a foot. This method of progression, however, is shared by other classes of molluscs.

The shells pictured here vary in appearance, but the animals that lived in them were of the same class. Like clams and oysters they had two shells, which covered the animal in the same manner. In the brachiopods the two shells are not identical in shape, yet each shell is bilaterally symmetrical. This means that if you carefully divide either shell along a line drawn from the "beak" at the center of the hinge to the outer edge of the shell, the two halves are alike.

Like clams and oysters, the brachiopods lived in the sea, and some of them are living there today. Their shells were preserved in the mud and ooze as the land emerged from the sea. When the mud was turned to stone by the deposition of mineral matter, one of three things happened: the shells were preserved in the stone; the imprint of the shells was preserved; or else the shell was replaced by mineral substances.

Sometimes the space between the two shells became filled with mud, and the shell was later dissolved out by water soaking through the rock. This left a cast of the interior of the shell.

The seas in which these animals lived have, of course, long since disappeared, and now the rocks formed from the sediments are subject to weathering and erosion. Thus fossils are loosened from the surrounding softened material. Then they may lie on the surface, or they may be easily freed from the surrounding rock.

The shells of other types of sea life may also be found preserved in fossil form, but lamp shells are abundant and well known. They are of particular interest because of the variety in their shape, size, and markings. They may be found in most limestone quarries; in many natural exposures of limestone and shale; along streams, or in roadcuts. Almost every state has some rock that contains fossil lamp shells.

NEW VARIETIES OF TULIPS ON DISPLAY IN "GARDENS ON PARADE" AT THE NEW YORK WORLD'S FAIR

LEAGUE OF NATIONS BUILDING PROVIDES A BACKGROUND FOR EXAMPLES OF TULIP PROGRESS

TIPS ON TULIPS

By ADOLPH KRUHM

THEY were there—a million strong—their flashing colors unfurled, heads high, a guard of honor of the greatest tulip show America has ever witnessed! Seven months before, wise bulb growers from Holland—the land of the bulbs' origin—had supervised their planting and forecast tulip time at the New York World's Fair. The tulips redeemed their promises.

In all the floral kingdom there are none more dependable than tulips. Planted in the fall, as they should be, they rarely disappoint. They offer us hundreds of varieties in a dozen different classes. They give us, also, a wide variety in size, shape and color of flowers, and in length of stem and blooming season.

The first to bloom are the so-called Single Early tulips, of which Pink Beauty—white with pink edge—is still one of the showiest and most popular. Another old-timer, now practically forgotten, was La Remarkable, a reddish wine-red tulip with a rosy-white edge. Then there are early and late double kinds; among the latter some that closely resemble peonies in size and form. The best-known and most widely-grown tulips we find in the May-flowering classes, under the family names of Breeder, Cottage and Darwin.

Of course each group presents new debutantes from time to time. Fortunately these do not make their bows as rapidly or as numerously as do the annual seed novelties that keep the gardener in a whirl! The introduction of a score of marigold novelties during the last five years is a case in point.

With bulbs, Nature herself puts on the brakes. Whether seedlings or vegetative mutations, all tulips are subject to similar processes of multiplication. Let's consider seedlings. It takes from four to five years to produce a mature flowering bulb from seeds. Out of the hundreds of seedlings a hybridizer grows, one may hold promise. That is the one the grower starts to multiply.

Depending on the character of the new variety, the mature bulb may split three or more ways. Taking three for an average, the original mother bulb will have produced six, or more, the second year. These, during the years to follow, will double the crop each year. By the end of a decade the originator of a tulip novelty may have as many as fifteen hundred saleable bulbs. This is not enough to export, but enough to know whether he has a prize novelty or a mediocre one.

While this process of multiplication is going on, the variety goes through the customary five-year trial period.

The newcomer's behavior must be as good or better than that of existing varieties. Flowers will be exhibited; judges invited. The reception it gets from the bulb world's most critical audience governs the value put on the novelty.

But it is not the original valuation of a tulip novelty that counts. A fair price should be maintained over a period of years to reward the originator for his years of waiting. If a novelty can take sunny or wet weather equally well; if it stands up well under varying soil conditions and has lasting qualities; if, finally, it does well under differing climatic conditions of different countries, then we have a truly worth-while novelty.

Such a variety is the Parrot tulip, Fantasy, that remarkable sport of the salmon pink Darwin tulip, Clara Butt. It first received the highly prized Award of Merit in Haarlem, Holland, back in 1919. The first bulbs, offered wholesale, were snapped up by other growers at one dollar each. In 1930 Fantasy still brought eighty dollars per hundred. This kind of novelty occurs rarely, and in this case it was a true bud sport of Nature, in the making of which man had no hand.

WELL-NAMED A TRIUMPH TULIP

This is Denbola, one of about a score of this class that is, in fact, a true floral triumph

"In Gardens on Parade" at the New York World's Fair visitors found three hundred distinct varieties; nine different classes. The collection included many novelties not yet generally offered. The assortment afforded an opportunity to study what growers are striving for in the way of novelties. And the number of varieties showing radical departures from accepted standards was really not great.

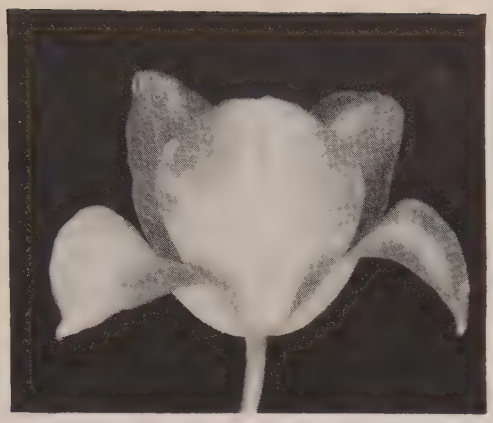
Among the Breeders, the tendency is still in the direction of the bronze-violet-purple, with the usual contrasty margins on the petals. The number of Breeders on the market today runs into hundreds. But among them are a few that are truly outstanding and will be the standard-bearers of their class for years to come. The following ten are not expensive novelties, but leaders nevertheless: Admiral Tromp—orange, flushed salmon; Garibaldi—lilac bronze, primrose edge; Cherbourg—golden-yellow, shaded apricot; Indian Chief—reddish mahogany, flushed purple; Bacchus—immense dark plum-violet; Thomas Stevenson—soft lavender, feathered red; Louis XIV—dark purple-edged golden-brown; Orange Delight—describes itself; Velvet King—glossy maroon-purple; James Watt—black-purple, edged dark brown.

Cottage varieties feature the more delicate shades of pink, yellow, rose, lilac, orange and many intermediate nuances. In a small percentage we find contrasty combinations, and colors that change as the flowers age. The majority have gracefully curved petals, and this characteristic of the Cottage tulips comes to a climax in a small group now offered separately as lily-flowering tulips.

Among Cottage tulips the following medium-priced varieties of recent introduction will fill the bill to perfection in the average home garden: Carrara—a pure white with yellow stamens; Pink Delight—a pink picotee edge gradually suffuses whole flower; Dido—rich pink with salmon and orange shades; Marjorie Bowen—buff salmon, shaded deep rose; Mayflower—deep rose with purple sheen; Scarlet Glory—brightest scarlet; Nectar—a long-lasting carmine red; Refulgens—enormous warm orange; Arethusa—pale primrose, edged lemon-yellow; Jeanne Desor—deep orange-yellow, edged scarlet.

Darwin tulips have always been noted for their strong self-colors. But if the "Gardens on Parade" collection of this class can be considered an indication of what growers are striving for, the tendencies in Darwins are now toward lighter, softer shades. A particularly interesting phase was encountered in the presence of ten pure-white varieties of varying shape, size and texture. This has been a development of the past decade.

Fifteen years ago there were no white Darwins, a white Cottage being sold as "the" white Darwin. But fashions



LEFT, CHERBOURG, A BREEDER TULIP; ABOVE, MARJORIE BOWEN, A COTTAGE TULIP; RIGHT, DRESDEN CHINA, A DARWIN TULIP

in flowers are dictated by a fickle public. The Hollanders quickly noticed increased and insistent demands for a white Darwin of greater substance and on longer, stronger stems than can be found on a Cottage tulip.

There were more than one hundred different choice Darwins in "Gardens on Parade", and even experts would greatly differ in their choice of a best ten. But I am taking a chance with the following on the basis of personal experience with these varieties: Eclipse—finest of all dark-red Darwins to date; Dresden China—soft lilac-rose of clear color; Princess Mary—carmine-rose, blush margin; Caroline Testout—glistening pink without flaw; Niphetos—long-lasting lemon-yellow; Glacier—grandest pure-white perfected so far; The Bishop—a gorgeous violet-purple; Faust—choicest of all deep satiny purples; Insurpassable—clear lilac; Maya—clear lavender, silver base.

Many of the varieties "on parade" are presented through some catalogs as "ideal" Darwin tulips. A distinction is being drawn between the run of Breeders and "Giant" Breeders. Some kinds that should be left in the Cottage class are introduced as new hybrids, Chinese Lantern, Chameleon and what-not tulips. It is quite bewildering, even to the seasoned gardener. Perhaps the lists are getting too long, causing subdivisions to be more desirable.

DRESSED FOR THE OCCASION
A Dutch costume goes with admiring this fine display of cottage tulips

But there were two classes that did hold genuine surprises. These I commend to the special attention of readers in search of the new and different. I am referring to the multi-flowered tulips, and to the Triumphs.

Believe it or not, every Dutch bulb grower through the centuries has condemned tulips that would bear more than one flower to the stem. Old "Baron de la Tonnaye", now offered by few, used to yield up to 250 flowers from a hundred bulbs—and the men who sold them didn't like to have me tell about it. That was the old-fashioned view.

It is different now. Bunch-flowering or multi-flowering tulips are now coming into their own. Why shouldn't they, when a variety like Monsieur Mottet, for instance, produced four to five lovely, creamy white flowers on one stem; all open at one time; a whole bouquet in itself!

There were a dozen varieties of these bunch-flowering tulips in "Gardens on Parade" at the World's Fair. Comparatively few visitors took notice of purple-garnet Dragoon, having as many as six flowers on one stem. Defender had, perhaps, the largest flowers of the lot—four to a stem—but unfortunately of a color admired by few, a bright magenta leaning toward purple. Rainbow is a well-named variety. The flowers were pink on Monday, changed gradually to rose by the middle of the week, becoming a real cerise before they finally passed out.

And now for the "piece de resistance" of this tulip story—the Triumphs! It is all of fifteen years since a Dutch grower came to me and said, "I want you to write an introduction for me for the greatest tulip find in generations." "All right," I said, "what is it?" "It's a new class," he said, "something entirely different, something so unique that it'll revolutionize the growing of tulips." And with this remark he handed me a list of more than thirty Triumph tulips, all of which had been developed quietly in Holland. I told him it could not be done. American gardeners, I warned, would not swallow novelties in chunks as big as that. He took my word and offered a few. Today there are available about a score of these Triumphs—correctly called so, for they stand for a triumph of the fine art of hybridizing.

Early here I referred to two old-time single tulips—Pink Beauty and La Remarkable. These two have been acknowledged as two of the parents of these remarkable floral triumphs. Their pollen (Continued on page 471)

The ESCAPE of SAMMY CECROPIA

By GEORGE A. SMITH

A FAT Cecropia caterpillar was brought into the biology class of the high school at Quarryville, Pennsylvania. After the class had studied at close range this bluish-green dragon-like animal armed with rows of horny projections, it was placed in a glass jar in the hope that it would spin a cocoon. Maple leaves were supplied and the jar was set out in full view on the demonstration table.

Several days later the class was mystified to find that the caterpillar had escaped by pushing off the cover glass. A search was begun in the out-of-the-way places of the room, and soon a shout from one student announced a beautiful brown, silken cocoon under the corner of the demonstration table itself. In a natural habitat the Cecropia caterpillar generally places its cocoon on the under side of some branch or twig, thus insuring some protection to the pupa, and upon emergence a convenient location from which it may hang with its back down while pumping the strength-giving life fluid into its immature wings. Apparently the under side of the corner of the demonstration table was the nearest to an ideal spot that our guest could find in a biology classroom enclosed within four tight walls.

SAMIA CECROPIA, AND ITS COCOON
Above, the corner of a demonstration table in a biology classroom, where the moth spun its cocoon, and the process of moistening

Careful examination revealed an opening or valve in the end of the cocoon through which the moth would emerge after its rest period in the pupal stage. This valve also served as an opening through which water could be poured occasionally to keep the pupa case from becoming too dry in the warm room. Check of the humidity of the biology room showed that it was almost as dry as a desert, and in no way suitable for a cocoon that, under natural conditions, would be moistened with rain and snow. A watering device was made by connecting a short piece of glass tubing to a small glass funnel. To pour water into the cocoon, it was necessary carefully to insert the end of the glass tubing in the opening, and then to raise the level of the water so that it would flow in by gravity.

The next episode of this unusual biology class experience occurred one morning, several months later, when a big brownish-gray moth with gorgeous spots and bands of red and white on each wing was discovered on the ledge of the display cabinet. Although it had been hoped that the moth would emerge while the class was in session, this extraordinary experience unfortunately did not fall to its lot. In order that the moth might be preserved for future study, it was quickly and painlessly consigned to a cyanide jar. The specimen was then carefully pinned out and dried before it was permanently mounted. It was also decided to mount the empty cocoon case along with the moth. The cocoon was carefully removed from the corner of the table, and cut through the middle with a razor blade so that when mounted one half would show the outside and the other the inside of the silken case. To make sure that all insect pests were killed in the cocoon before it was mounted, the two halves were sealed in the cyanide jar for several days. Then, as an extra protection against insects that might enter and ravage the specimens, a small quantity of paradichlorobenzene was placed in the mounting case. Many beautiful moth and butterfly specimens are soon destroyed because they are not properly disinfected and protected. The prepared moth and the two halves of its cocoon were then carefully placed, along with an identifying label, in the mounting case, and finally displayed in a prominent section of the display cabinet.

Although "Sammy Cecropia", the name by which the class referred to *Samia cecropia,* under ordinary circumstances would have completed his life cycle in a more natural environment, the incident of his capture by a curious school boy, and his subsequent escape from a glass jar, gave rise to a sequence of unusual events that told one of Nature's marvelous stories to a biology class.

Woolly entertains company. A friend came to visit and brought along his own pet flying squirrel. Woolly—on the left—was quite curious about this visitor and spent several minutes cautiously sniffing. Finally, however, he decided that the newcomer would make a good playmate and the games were on.

The Story of Woolly, A Flying Squirrel

As told in pictures and words by Karl H. Maslowski

Woolly became my friend and companion quite by accident. One day I was out on a bird study ramble in a beech forest not far from Cincinnati. At one spot a stick barred my path and I reached forward to break it off. As my hand stretched forward a baby flying squirrel seemed fairly to be growing on the stick. He was breathing heavily and seemed quite tiny and terribly frightened. He clung desperately to the branch, appearing to be trying to regain the breath evidently lost in a tumble to the limb I had chanced to grasp.

Whence Woolly came, and how, I shall never know. Perhaps he had been engaged in a rough and tumble with his brothers and sisters and had been pushed from the nest high up in a den hole in one of the nearby beeches. Perhaps he tried some stunt far beyond his youthful powers or experience. In any event, there he was, and there seemed no way of discovering his family residence and restoring him to it.

So, although Woolly had no choice in the matter, he and I continued on the bird ramble. Then we turned our steps homeward, he to begin two years of life in a world peopled by large, two-legged mammals, and I to enter upon an experience of happy friendship with a son of the wild. Within twenty-four hours Woolly—for he was certainly a woolly little fellow—had accepted me and what fate seemed to have held in store for him.

Food, of course, was an immediate problem, and Woolly went on a diet of diluted milk from the end of a medicine dropper. Only a few minutes were necessary to learn the trick. He liked this means of getting his food, and all his life he was ready for a dropper full of milk, orange juice, prune juice, cider, pop or even beer.

Woolly's favorite lodging place during most of the day was the lower right-hand vest pocket. Like other members of his clan he became most active after twilight. If, however, one wished to lure him from his hideout at any time, a peanut was always sufficient as a reward for his appearance.

It is hard for one who is not familiar with habits of flying squirrels in the wild to realize the extent of the change that confronts a little creature like this, suddenly snatched from its natural home, and from the care of its mother, and brought into man's home. The little squirrel has known no daylight, for all of its short life has been spent in the recesses of a snugly-woven nest, or the depths of a hollow tree. Its only food has been its mother's milk, or perhaps, the soft kernels of immature nuts or the opening buds of leafing and fruiting trees. All at once, he is transplanted into a world of man-made structures and strange surroundings, hearing only a new and unintelligible language, presented with unaccustomed food, blinded with the glare of daylight or electricity, and without the companionship of any furry comrade, even of a different race. Yet so strong is the trust in all Nature possessed by young animals that the little squirrel, its hunger once satisfied, accepts the new regime, with all its contrasts, and clings to the new friends it has found. The case of the flying squirrel well illustrates the feeling of kinship and trust with which wild creatures honor us when they are treated with kindness. They accept us as a part of Nature, and, with few exceptions, continue to trust us as long as they are well treated.

Flying squirrels should really be called gliding squirrels, since the folds of skin that extend along the sides between the fore and hind limbs do not admit of flight as in birds and many insects. However, as an aid to gliding, these wings are highly efficient. After running up a tree to gain height the little animal can glide many yards.

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Woolly was always ready for a trip and, as he grew older, became a constant travelling companion. He particularly enjoyed picnics or camping trips, and always made it a point to sample whatever was being prepared for the meal. Here we see him putting his stamp of approval on the contents of a spoon used to stir a pot full of apple sauce. Wrinkling his nose, he indicates that it smells fine. Just to sustain his judgement he samples it and decides that it tastes good, too.

Woolly would go to any lengths for a peanut. He had acrobatic ability equal to taking one from my mouth, the meanwhile tickling my Adam's apple when he tucked his soft tail under my chin. This procedure nearly dislodged the peanut anyway.

Once obtained, the peanut would be carried to my shoulder and quickly hulled. Woolly was always careful to see that most of the shells were stuffed down inside my collar.

Woolly's best trick was to jump for food held in my hand. He would come sailing down like a magic carpet.

For two years Woolly lived with me, his spirit finally being ferried to that beechnut tree heaven where all good flying squirrels must surely go. During his lifetime he travelled more than 15,000 miles. He was probably the first flying squirrel to go through the Holland Tunnel, fly in a plane over Cincinnati, peer out from the top of the Washington Monument, visit the Wright Memorial at Kitty Hawk, and sail around Bonaventure Island.

Some Common Rocks and Minerals

The sixth in Nature Magazine's series of special educational inserts

By E. LAURENCE PALMER

NO ONE would assume that an eight-page article could deal exhaustively with birds, insects or trees. It is hoped that no one would expect this article on rocks and minerals to be anything like a complete treatment of the subject. If it leads one to consult more exhaustive sources, or to make first-hand studies of the rocks and minerals available locally, it will have served.

While it is doubtful that anyone without some previous experience could, with the help of the material given here, identify accurately or appreciate thoroughly any great number of rocks, some activities may be suggested that will help one to learn directly about the properties of local rocks and minerals.

This page may merely help define some of the words used in the charts that follow. Almost anyone can distinguish the substances that are called mud, sand, gravel, humus, snow and lime. But what happens to these things if they are left to themselves? We know that they may be washed here and there by water; that they may be blown by the wind; that they help or interfere with the cultivation of lands. Mixing them, we can make the surface of the earth suitable for highways, for growing roses, or for pasturing cattle. Almost all that is done in agriculture involves such activities, and agriculture affects all peoples.

Consider also what happens to these things when buried under great masses of earth, exposed to high or low temperatures, subjected to twisting strains, or changed slowly or quickly in any way. Briefly, most of them may be compacted to points where, if a mass is lifted, adjacent parts will be lifted also. The individual grains with which we started may still be recognized, even though they may have been cemented together in one way or another. Such consolidated materials may be formed from sediments dropped in moving currents of air or water, thus making *sedimentary rocks.* This may loosely be compared to what happens when snow falls to form snowbanks.

If the consolidated materials are pressed further they may change their nature, and form *metamorphic* rocks. The chemical nature of these rocks may be the same as when they were sediments but they differ physically.

These metamorphic rocks may be buried still deeper or changed further by heat, or by other means, until they may become a molten mass. The rocks thus formed are *igneous.* If this mass is allowed to cool slowly, or the pressure is released slowly by the mass above wearing away through erosion or other means, the materials in the molten mass may variously crystallize. Rocks formed in this way are *intrusive,* while those that relatively more quickly make their way to the surface through cracks or are released through volcanic action are *extrusive.* Rocks of each of these types are discussed in the succeeding charts. These igneous rocks—and the others as well—when exposed to the action of weather break down irregularly. The softer parts naturally wear away first. Those parts that are easily dissolved in water will disappear more quickly than others, and sooner or later both soft and hard parts may be piled up again as sand or mud or gravel.

So far as the minerals are concerned each of these may be investigated by anyone to his own satisfaction. Some of the things to look for are suggested in the keys to the charts on minerals. Others might easily have been added. But all of the characteristics used in describing rocks are determined by what happens when they are struck, broken, bent, twisted, squeezed, frozen, illuminated by different kinds of light, heated, exposed to water or acids or to an electric current; how they behave when mixed with other minerals under varying conditions and with which they will mix; how much they weigh, and so on. Mineralogists have naturally established standards for measuring the qualities of the different minerals. For example *hardness* is compared with that of a diamond, which has a hardness of 10, and talc, which has a hardness of 1. The other minerals range between these figures. Similarly a scale of *fusibility* has been established to denote at what temperature the substance will melt. Instead of using degrees on a thermometer it is more common to say that a substance like sulphur, which melts at a point a little above that of boiling water, has a fusibility of 1, while quartz, which, even in the hottest part of a flame of a blowpipe, will not melt, has a fusibility of 7, or is ordinarily considered infusible. Homely ways for carrying on some simple experiments in this field are given on the School Page of this number.

This article is a modification of a similar one by the author published as one issue of the *Cornell Rural School Leaflet* by the New York State College of Agriculture at Cornell University. It is felt that reactions to material in that number of the *Leaflet* have permitted improvement in this presentation. Appreciation is expressed to the College for permission to revise this material and to use it to supplement the author's personal experiences with rocks and minerals. The illustrations are by the author and his wife, Dr. Katherine Van Winkle Palmer. Recommended are:

Elements of Mineralogy, Crystallography and Blowpipe Analysis, by Alfred J. Moses and Charles Lathrop Parsons, D. Van Nostrand, New York. 1906.

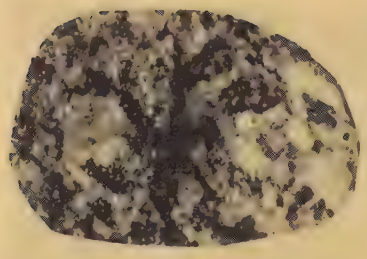
Dana's Manual of Mineralogy, by William E. Ford, John Wiley and Sons, New York. 1912.

Fieldbook of Common Rocks and Minerals, by Frederic Brewster Loomis, G. P. Putnam's Sons, New York. 1923.

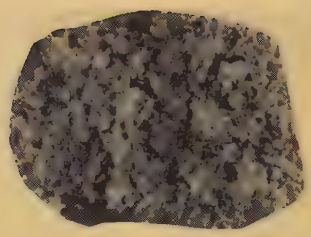
Handbook of Chemistry and Physics, by Charles D. Hodgmen and Norbert A. Lange, Chemical Rubber Publishing Company, Cleveland, Ohio. 1928.

Getting Acquainted with Minerals, by George Letchworth English, Mineralogical Publishing Company, Rochester, New York.

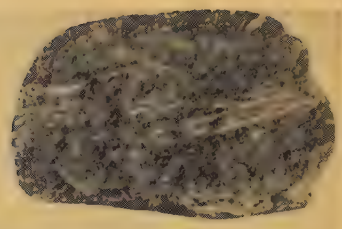
Quartz Family Minerals, by H. C. Dake, Frank L. Fleener and Ben Hur Wilson, McGraw-Hill Company, New York. 1938.



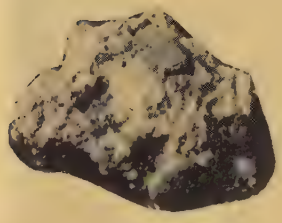
Granite



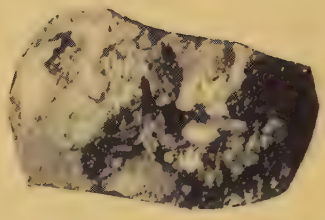
Lava



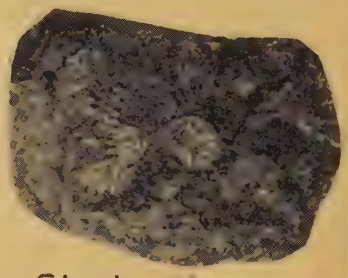
Schist



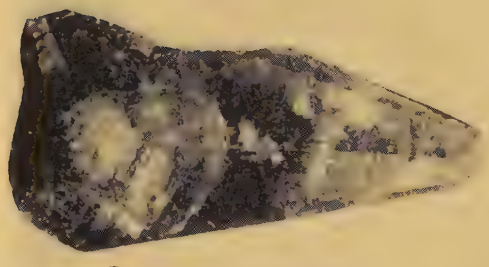
Conglomerate



Breccia

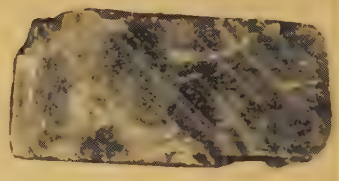


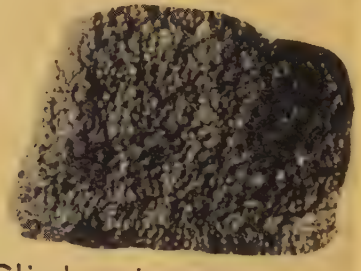
Shale



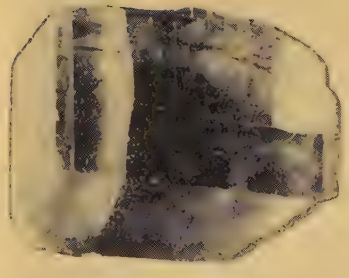
Calcite crystal

Yellow calcite





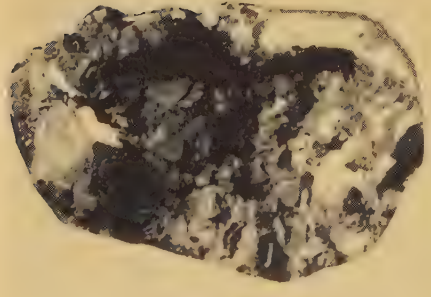
Clinton iron ore



Halite crystal

Copper

Iron pyrites



Sulphur in chalk

Graphite

PLATE 1.

Chalcedony
Flint
Quartz crystal
Quartz geode
Oligoclase feldspar
Muscovite
Hornblende
Gypsum
Gypsum crystal
Asbestos in serpentine
Talc

PLATE 2.

UNCONSOLIDATED MATERIAL				
Nature	GRAVELS and TALUS. Composed of pieces of rock larger than peas. If water-worn and with rounded edges, it is gravel, but if made of angular pieces unworn, as at foot of cliffs, it is talus.	SAND. Much sand is quartz made from the disintegration of such quartz-bearing rocks as granite. Coral-beach sands may be of lime. Ordinarily of particles smaller than peas.	MUD. Loose, generally fine-grained earthy materials commonly formed of softer parts of rocks such as kaolin, feldspars, micas, and so on. When dry, loose dust or compacted clays. Insoluble.	LIME CARBONATE. Animals and plants in the sea convert soluble lime carbonate—$H_2Ca(CO_3)_2$—into the insoluble—$CaCO_3$—freeing carbon dioxide. Algae and foraminifera vital in this.
Where found and how formed	Commonly formed in watercourses where there is a swift current, or at base of tall cliffs and mountains. Gravels may be formed by wave action, which rolls and wears the materials.	Materials that are deposited from moving air or water before the silts, muds and clays. May make extensive dunes and deserts and border many waterways, as the Great Lakes.	In slowly-moving parts of waterways, over the depths of the oceans and as *loess* by wind over great stretches of land. May form loose floor on bottom of waterways dangerous or helpful to life.	Foraminifera may be the size of a grain of sand or much larger. Lime deposits may cover the sea floor or form marl in bodies of fresh water. Corals associated with some lime deposits.
Uses	Common as fillers in road-building. Used in concrete, and, since it does not hold water well, may be used for playgrounds, paths and the like. Suitable for limited kinds of plants.	Quartz sand may be biologically nearly sterile, but may hold valuable mixtures and provide superior water-holding qualities for some plants in some regions. Unstable, needs anchorage.	Properly mixed with air, chemicals and water, mud provides excellent growing medium for plants. Helps build up richest fertile areas on the earth and supplies major sources of farm wealth.	Chalk is slightly consolidated lime. Great beds of rock are built by lime-depositing creatures. Agassiz estimated coral could build up about 40 feet of deposit in 1000 years.
CONSOLIDATED SEDIMENTS				
Nature	CONGLOMERATES are consolidated gravels cemented together and showing water-worn character of component units. BRECCIA is made of consolidated rocks not water-worn.	SANDSTONE is chiefly quartz sand cemented with silica, iron oxide or clay, but, when broken, shows sand grains. May be porous so that 30 percent is space between the grains. May hold water.	SHALES are consolidated muds still in the layers in which they were laid down and frequently splitting along planes of varying degree of fineness of composing materials. Generally weather away.	LIMESTONES are compacted lime carbonate. They effervesce when treated with hydrochloric acid except that dolomitic limestone of calcium carbonate and magnesium does only with hot acid.
Where found and how formed	Conglomerates in which the cements and pebbles or bowlders are contrasted are called pudding-stones. Many conglomerates show by scratches their origin in glacial action.	Constitutes about 15 percent of the stratified rocks of the earth. Varies in strength due to differences in cement. ARKOSE is sandstone made of unaltered feldspar; origin, continental or marine.	Constitute about 80 percent of the stratified rocks that overlie the bed rocks of the earth. Some are of fine, hard quality, in uniform beds; others, loosely consolidated and of a heterogeneous nature.	Limestones constitute about 5 percent of the earth's stratified rocks. The lime may be mixed with sand, clay and other materials. Lime deposits are commoner in warmer seas.
Uses	May be cut and used as building stones, which are attractive if component parts vary greatly. Useful in interpreting the physical geography of the past where they are found.	Quarried or crushed and used in the building trades, although less so than in the past. Probably less used than limestone. May be crushed and used in road building.	Some are used in the making of cement; others, make flagstones. They both help and interfere with maintaining a water supply since their irregular nature affects the water table.	Valuable as source of lime for fertilizer and making mortar. Heated to just over 900°C, is so changed that, if water is added, the mixture may become as hard as the original limestone.
METAMORPHIC FORMS				
Nature	GNEISS (pronounced nice), formed of quartz, feldspar and mica, with mica usually in more or less definite plane giving a banded appearance in cross section. Little pore space.	QUARTZITE is metamorphosed sandstone so firmly cemented that fracture may take place through component sand grains rather than around them. Of quartz sand with silica cement.	SLATES are shales metamorphosed by pressure and heat into flat plates, which may not agree with the original stratification. The mineral grains are too fine to be seen with a lens.	MARBLE is metamorphic limestone changed by heat to a crystalline rock. Uniformly textured, does not tend to split. Marble takes a high polish; limestone does not.
Where found and how formed	There is a tendency for gneiss to split in one direction. The rocks are conglomerates changed by heat and tremendous pressure. Hornblende may replace the mica. Garnets may occur.	Found as rock or as very hard pebbles. If mashed in formation, may appear as a *quartz schist*, or, if impure because of presence of mud, a MICA SCHIST may be formed.	Found in older rocks such as the Cambrian and Ordovician, an important supply coming from Vermont, New York, Virginia and elsewhere. Rocks are quarried, split and sawed or ground.	Large quarries in Vermont, Massachusetts, Pennsylvania, and in many places in the West. In dolomitic marbles, calcium carbonate is largely replaced by magnesium carbonate.
Uses	Heavy hard rocks originating deeply. May be broken and used in heavy construction activities. SCHISTS are usually softer and weather less successfully.	Quartzites and schists may be too hard to be cut conveniently, but crushed quartzite is used in concrete work, in road building and in glass making.	Formerly used principally in natural planes as tables, roofing, flooring; now used also with asphalt filler and paint in making artificial tiling, shingles and the like.	Used in interior decoration and in monuments. Used in the latter way may deteriorate by weathering but will serve for a reasonable period.

ORGANIC MATERIAL, the remains of plants and animals, either their bodies or waste products, make loose *humus* in the soil and provide acids, salts and carbon compounds.	WATER. H_2O. Freezes at 0°C or 32°F; boils at 100°C or 212°F. Tasteless. Transparent. Almost universal solvent, so rarely pure in nature. As vapor forms clouds, fogs; collects as dew and rain.	**INTRUSIVE ROCKS Light-colored** **Nature**	GRANITES, a combination of quartz, orthoclase feldspar and hornblende or augite; often with mica. Usually light in color. Usually individual minerals visible to naked eye.	SYENITE, with texture like granite; of orthoclase and either hornblende, augite or mica but always without quartz. It may include other feldspars than orthoclase. Light-colored.
These materials help in breaking down of rock compounds and themselves add to the chemical nature of the mixture. They may accumulate as in peat beds and bogs, or be dissipated.	In all living things. Covers 139,440,000 square miles of the earth's 196,950,000 square miles of surface, and rare only over the 5,000,000 square miles of desert; otherwise in soil.	**How Formed**	Igneous; cooled very slowly, probably under great pressure. Intrusive. Large grains set in collection of smaller grains form *granite porphyry*. Varieties named from dark minerals.	Formed like granite and cooled slowly under pressure, commonly under the folds of mountains. Less common than granite and does not occur in such large masses. Intrusive.
Valuable as source of food for plants of many sorts, as fuel when dried, as mulches in gardens, as holders of soil moisture. Green manures renew the supply, which may be exhausted.	Essential to life in solution of foods, translocation of foods and wastes. Important in mingling parts of earth's surface and important aid to commerce for man. Provides beauty and recreation.	**Use and where found**	Common in Adirondacks, Lake Superior region, Black Hills, Rocky Mountains and Sierra Nevadas. Superior building stones. Basic for much soil formation.	Best localities in Arkansas, Colorado, the White Mountains, eastern Canada from Labrador to Ontario, Minnesota, Norway and elsewhere. Used as building stones.
Consolidated organic remains may be in many forms as PEAT, BITUMINOUS COAL, or, if from bones, shells and waste products, may be GUANO, ROCK PHOSPHATES and the like.	SNOW BANKS. Formed by crystallization of water vapor into 6-pointed stars and settling by gravity through the atmosphere to form strata of snow in banks or great layers. White. Slippery.	**INTRUSIVE ROCKS Dark-colored** **Nature**	DIORITE without quartz but with plagioclase feldspar plus mica and/or hornblende. GABBRO with plagioclase feldspar and any pyroxene, commonly augite.	PERIDOTITE, blue or dark rocks composed of olivine and any of the pyroxenes; generally appear to be made of large crystals. No feldspar. May include garnet, chromite and others.
Phosphate beds occur in Tennessee, the Carolinas, Florida, great area in western South America in Chile. Soft coal deposits extensive through the Great Basin and elsewhere.	Covers the polar caps of the earth and extends toward the equator in winter seasons and at great elevations. Can form protective blanket preventing rapid changes in temperature.	**How Formed**	Igneous; cooled slowly much like granite. Intrusive. May appear as a porphyry, or of the even granular type. Dense gabbro with small crystals is DIABASE-formed near surface.	Generally associated with and formed like gabbro, differing in the absence of feldspar. Usually found as dykes, sheets and small intrusions. Are intrusive. They are not common.
Essential use is as fertilizers, fuel and in certain types of manufacturing industries. Some highly valuable in making explosives, useful in agriculture and unfortunately in war.	Helps many winter plants and animals by insulating cloak. Provides continuous flow of water from high altitudes. Assists in some types of transportation. Provides beauty and recreation.	**Use and where found**	Associated with the other igneous rocks but particularly good in the White Mountains and in the Rockies. Used extensively as building stones. Both generally dark.	Important sources of platinum, chromium, nickel and diamonds. Generally dark and heavy because of iron in them. Diamonds of Africa and Arkansas from these rocks.
Metamorphosed carbons may appear as GRAPHITE, as DIAMONDS and as ANTHRACITE COAL. Of these, the diamond is the hardest and the graphite the softest.	ICE. Formed by freezing of liquid water. Increases in volume when freezing. May be caused by increased pressure within limits as in parts of glaciers. When pure is transparent. Brittle.	**EXTRUSIVE ROCKS** **Nature**	BASALT or traprock, a mixture of plagioclase feldspar, magnetic iron ore, olivine and a pyroxene. Crystals not seen. Dark. FELSITE, light and with more feldspar.	OBSIDIAN, clean, lustrous, hard glass which forms crusts on lava flows. If duller, the substance is PITCHSTONE; if frothy, PUMICE. Always hard; often has gas cavities. Extrusive.
Diamonds usually associated with volcanic origin. Hard coal is formed by softer coals under pressure. Natural gas and petroleum also of organic origin.	Covers bodies of fresh water in colder parts of the earth. When expanding in freezing, breaks up many rocks and in glacier form grinds rocks. May cause death of plants and animals.	**How Formed**	Formed by molten material being forced up into other rocks through cracks and fissures large or small.	Formed by the quick cooling of lava flows from volcanoes. Material which is expelled explosively may form volcanic ash, tuff and volcanic breccia.
Uses well-known and varied. So valuable that individuals as well as whole nations do not hesitate to try to annihilate others who possess these forms of wealth.	Serves as reservoir for water. May kill fish by cutting off access to air and water birds by cutting off access to food. Provides unique transportation, sport, and helps preserve foods.	**Use and where found**	One of commonest igneous rocks in New England, the Palisades of the Hudson, in Lake Superior region and the far west particularly northwest. Used for filling and ballast.	Found in Rockies, California, the Cascades, Sierra Nevadas, the Yellowstone. Primitive peoples used it for knives, ornaments and weapons. Pumice used for polishing.

NAME OF MINERAL	CALCITE (Lime) $CaCO_3$	HALITE (Salt) NaCl	GALENA (Lead Ore) PbS	SULPHUR S
COLOR, STREAK AND WEIGHT	White to colorless, or sometimes tinted with pink, yellow or blue, with a glassy or earthy luster. Streak, colorless. Effervesces freely with hydrochloric acid. Weight, 2.72 times that of water. Clear crystal of Iceland spar shows double refraction of light.	Colorless to white, translucent or transparent, vitreous, soluble in water and producing a colorless streak. Weight, from 2.1 to 2.2 times that of water. It, of course, tastes salty.	Lead-gray color, metallic, producing a lead-gray streak. Crystals, opaque, are inclined to glisten and sparkle because of their exposed faces. The metal is not easily penetrated by radium. Galena is 7.5 times as heavy as is water. Poor conductor of electricity.	Characteristic sulphur-yellow or even gray to brown or reddish. Masses, opaque, but crystals sometimes translucent. Resinous for most part. Streaks, pale yellow or white. 2.05 to 2.09 times as heavy as water. Good insulator of electricity. When rubbed, becomes negatively charged. Non-metallic native element.
HARDNESS, FRACTURE AND CRYSTALLIZATION	Hardness, 3, may be scratched with a penny. Conchoidal fracture seldom seen because of ease of cleavage which is perfect in three directions oblique to each other and at about 105°. Structure, granular, earthy, stalactitic or crystalline. Crystallization, hexagonal, rhombohedral, prismatic; may twin and be of great beauty.	Hardness, 2.5, may be scratched with a fingernail. Cleavage, perfect cubes. Crystals, nearly always cubes but sometimes hopper-shaped or with faces concaved by four-sided pyramids. Halite is often granular, massive to compact, depending upon method of crystallization.	Hardness, 2.5, and can be scratched by a cent. It breaks in three directions parallel to the cube faces showing isometric cubes or crystals. Highly malleable, ductile. The ore is cleavable, coarse or fine grained, massive. When fine grained, it may seem to be compact. Occasionally octahedral crystals are formed.	Hardness, 1.5 to 2.5, may be scratched with the fingernail. Very brittle though masses may sometimes be cut. Some forms plastic. Has an uneven or conchoidal fracture and no distinct cleavage. Occurs in orthorhombic crystals often in double pyramids or is earthy, stalactitic, fibrous, reniform, massive.
GENERAL RECOGNITION CHARACTER AND HEAT EFFECTS	Occurs as veins; in caves, as stalactites; as deposits in springs, in shells of animals; as cementing material in sandstones; cementing shells together to make coquina; as limestone; chalk or marble associated with igneous, sedimentary or metamorphic rocks.	Solubility in water and the taste usually suffice for quick identification. 100 grams of water at 100° C. will dissolve 39.8 grams of salt.	Melts in a candle flame as globules of metallic lead on galena. Melts at 327° C; boils at 1525° C. The outstanding characters are the weight, softness and usual cubic cleavage which may make it seem to be brittle.	Melts at just above boiling point of water, or from 112.8° to 119.3° C. Very poor conductor of heat and will crackle when warmed due to differences in rate of expansion.
WHERE AND IN WHAT FORMATIONS FOUND	Most limestones are accumulated animal shell remains or deposits of lime from water. These layers are built up, forming great beds which may be raised to mountain ranges. Subjected to pressure and heat they may turn to marble. Loosely compacted, they may make true chalk (not school chalk which is gypsum).	Makes up about 2.5 percent of seawater, more in some lakes, and found as rock salt where ancient seas have dried up. Germany, Austria, New York, Michigan are leading producers of salt. It is associated with gypsum and in the Southern and Western states the presence of salt is used as an index to the possible presence of petroleum.	Found in veins and irregular masses in igneous and in metamorphic and commonly in masses in sedimentary rocks. Associated with sphalerite, chalcopyrite, pyrite, calcite and argenite. Possibly most widely distributed of metallic sulphides. Important mines in Missouri, Utah, Colorado, Idaho, Iowa, Kansas and Oklahoma. 1937, U. S. production about ½ that of 1924 but thrice that of 1931.	Found in beds commonly associated with live or extinct volcanoes, in gypsum beds or salt beds, also combined with metals as sulphides such as galena, pyrite and chalcopyrite, and as sulphates when united with metallic oxides as in gypsum, barite and others. Sulphur is widely distributed in the world but Texas and Louisiana beds are the most successful commercially.
USE AND COMMERCIAL ABUNDANCE	One of the most important minerals to life, building bones and shells. Fresh-water sponges are not found in limy waters but snails and other molluscs are. Portland cement is made of lime, shale and gypsum, and in 1937 was 171 million dollar United States industry. Lime alone was a 30 million dollar industry. Its value in limestone and as fertilizer and in other products is not easily obtainable.	Essential to the life of most animals. Used in cooking and preserving food, in manufacture of glass, soda ash and soap, in bleaching and in industry, also used in refrigeration, to some extent in the care of roads, in oil refining, and as the chief source of sodium compounds used by the chemical industries. United States produces about ⅓ of the world's salt, annually about 8 million tons.	Extracted by roasting the ore, frequently as a by-product in the extraction of silver, with which it is commonly associated. United States production in 1937 about twice that of second-place Australia. Used in making pipes, paints, bullets, poison compounds, in solder and type-metal, for linings for tanks, and in electrical equipment, as in dry cells, and in many other ways.	Extracted by forcing steam into beds, melting the sulphur which is forced out and then cools and hardens. United States leads in production followed by Italy and Japan. Texas beds average 125 feet thick. Used in chemicals as insecticides, in medicine and fertilizers, in vulcanizing rubber, in gunpowder, matches and in making sulphuric acid for industrial uses.

COPPER and COPPER ORE (Chalcopyrite) Cu and Cu FeS_4	IRON ORES (1) Pyrites FeS_2 (2) Hematite Fe_2O_3 (3) Magnetite Fe_3O_4 (4) Limonite $Fe_4O_3(OH)_6$	QUARTZ SiO_2	MICAS (1) Muscovite $H_2K\ Al_3(SiO_4)_3$ (2) Biotite $(HK)_2Al_2(SiO_4)_3$	KAOLINITE China Clay $H_4Al_2Si_2O_9$
Copper, red to black and tarnishes; ore, brassy yellow. Both metallic. Copper streaks shining copper red; ore streaks black. Copper, 8.9 times as heavy as water; ore, 4.2 to 4.3 or about 5 times as light as gold. Copper, 2nd to silver as a conductor of electricity.	Color, (1) brass yellow; (2) red-brown to black; (3) black; (4) dark brown to black. Luster, metallic, in (1) splendent; in (4) dull. Streak, (1) green to brown black; (2) Indian red; (3) black; (4) yellow brown. Weight, (1) 4.95 to 5; (2) 4.8 to 5.3; (3) 5.18; (4) 3.6 to 4 that of water. Metal very ductile, malleable.	White, yellow, pink, blue, smoky, black, green, red, brown or transparent with a glassy, splendent to dull luster. May appear to be greasy. Crystalline and massive varieties. Insoluble. Streak, white, colorless. Weight, 2.6 to 2.7 times that of water.	(1) Yellow to white, pearly, vitreous. Weight, 2.76 to 3. (2) Brown to black, splendent. Weight, 2.95 to 3.2 that of water. Both are elastic, and if thin sheets are hit with a dull instrument 6-rayed star "percussion figures" are formed. Some, transparent.	White to grayish blue or yellowish, dull. Insoluble and about 2.6 times as heavy as water. Heat resistant. Opaque. Streak, colorless.
Hardness, copper, 2.5; ore, 3.5 can be scratched with a knife. Copper, highly ductile and malleable; the ore, brittle. Copper, rough or jagged fracture; ore, uneven. Copper occurs in irregular grains, sheets, isometric cubes or octahedral crystals; ore, in metallic veins, tetragonal or sphenoidal crystals.	Hardness, (1) 6 to 6.5; (2) 5.5 to 6.5; (3) 6; (4) 5 to 5.5. Fracture, uneven in (1) and (3), uneven or fibrous in (2) splintery in (4). Crystallization, (1) isometric cubes with striated faces or granular; (2) earthy, mica-like or in hexagonal rhombohedral crystals; (3) granular or massive, isometric, octarhombohedral crystals; (4) earthy, fibrous or otherwise, noncrystalline.	Hardness, 7, not scratched with glass. Fracture, conchoidal to uneven. Brittle. Cleavage, rare. Crystals, hexagonal and other types. Crystalline varieties: colorless; smoky amethyst; milky quartz. Massive varieties: waxy, translucent chalcedony; variegated chalcedony or agate; banded or onyx agate; opaque or semitranslucent, tough, usually gray flint; splintery chert; opaque, colored jasper.	Hardness, (1) 2.25; (2) 2.5 to 3 both easily scratched with fingernail. Both split into sheets as thin as 1/500 of an inch. Crystals are rare, monoclinic in six-sided plates sometimes some feet across. The lithia mica *lepidolite* lacks distinct cleavage but occurs in small scales. Phlogopite may show star when light is transmitted. It is usually amber.	Hardness, 2, may be scratched with fingernail. In compact, claylike masses or friable. By weathering or changing of feldspar, the potassium of feldspar unites with carbon dioxide to make water-soluble potassium carbonate. The water, part of the silica and aluminum make kaolinite. Generally not in crystals.
Excellent conductor of heat. Melts at 1083°C; boils at 2310°C. Almost all of the copper minerals are brightly colored. This and hardness help in identification. Chalcopyrite is softer than steel and might be confused with gold but for weight.	(1) Easily fusible to magnetic globule; (4) fusible with difficulty; (2) and (3) infusible. (1) Soluble in hydrochloric acid; (2) and (3) slowly soluble. Good conductor of heat and of electricity. (3) Strongly magnetic. Metal melts at 1530°C.; boils at 2450°C.	Fusible with great difficulty. The massive quartzes do not break to show the crystalline form, some like pseudomorphous quartz replace organic material as in petrified wood, others may have been formed by cooling quickly.	(1) Thin splinters melt with blow pipe; (2) melts with difficulty. Lepidolite may be melted on a coal stove. The softness, sheet cleavage, luster and elasticity are sufficient for ordinary identification.	Identified by friable nature, the fact that when dry it sticks to a wet tongue and gives off a characteristic clay odor when breathed upon. Is always dull but when burned may change in appearance and become very hard.
Found pure or in other ores, best combinations being in chalcopyrite, chalcocite, bornite and tetrahedrite. Unlike gold, the chalcopyrite sometimes called fool's gold is brittle when pounded and produces black streak. Found in igneous and sedimentary rocks particularly in Lake Superior region, also in Alaska, Arizona, California, Michigan, Montana, Nevada, New Mexico, Tennessee and Utah.	(1) Found extensively with chalcopyrite, sphalerite and galena in veins in igneous and in sedimentary rocks; (2) in oolites, columnar crystals in igneous rocks, red sandstones and with metamorphic rocks particularly in Minnesota, Alabama and Michigan; (3) in sands, beds, plates and lenses in Scandinavia and New York; (4) in beds, marshes, caves, on surface in Alabama particularly.	About 12 percent of earth's crust to depth of 10 miles. Found in veins, in granites, sandstones, sand, conglomerates, gneisses, schists, quartzites, rhyolites and pegmatite. Some of best crystals found in limestone in New York; others, in Arkansas. Amethyst gems of quartz from Brazil and the Ural Mountains, chalcedony from western states and Germany, and jasper from Siberia and Africa.	(1) Best from India, North Dakota, Virginia and North Carolina as commercial isinglass. (2) Best from Vesuvius and Canada. Lepidolite found with pink tourmaline in California and in Maine in coarse grains. Phlogopite, best from Canada where it is found in limestones and in serpentine. Micas may be in veins or disseminated through rocks.	Associated with feldspar-bearing rocks. Contributes to the muds coming from disintegrating granites, the quartz parts of the granite remaining as sand. Rather generally and widely distributed through the world.
Copper and tin, early used by bronze age man. Extracted by smelting, leaching or electrolysis. Used now in electric wiring, copper plating, roofing, piping, marine equipment, nails and money. A 1-cent piece is about 95 percent copper, 4 percent tin and 1 percent lead. Copper produced in United States in 1937 was worth $202,000,000, more than twice that of second-place Chile.	(1) in manufacture of sulphuric acid and as index in Africa of gold. (2), (3) and (4) as source of iron and (4) as yellow ochre in paints. U. S. production of iron and steel in 1937 about 88 million gross tons; twice that of Germany; nearly 3 times, Russia, 4 times, Great Britain, 8 times, France and 10 times, Japan and Belgium.	Used in crystalline form for gems, ornaments, optical and chemical apparatus, as sandpaper, in glass and cement; in massive forms as plaster, in soaps, pottery, paints, and as building stones. Sand and associated gravels in the United States in 1937 was worth approximately 100 million dollars. Quartz forms the rigid backbone of such valuable building stones as granite, sandstone and quartzites.	(1) Used as sheets in stoves and electrical equipment or ground to use in wall paper, as artificial snow for theaters or Christmas decorations, in paints, roofing and tires. (2) No commercial use. Lepidolite may be used in glass but phlogopite is the best of the micas for electrical uses. American micas are useful only in the inferior ways for the most part.	Used in making tiles, drain-pipes, bricks, stoneware, roofing, crockery, fire bricks, paper filler, and the finer forms in the making of porcelain and of china.

NAME OF MINERAL	FELDSPARS (1) Orthoclase $KAlSi_3O_8$ (2) Plagioclase $NaAlSi_3O_8$ (3) Albite to $CaAl_2Si_2O_8$ (Anorthite)	AMPHIBOLES (1) Tremolite $CaMg_3(SiO_3)_4$ (2) Actinolite $Ca(Mg\ Fe)_3(SiO_3)_4$ (3) Hornblende $CaMg_3(SiO_3)_4$ and $Na_2Al_2(SiO_4)_3$ and $Mg_2Al_4(SiO_6)_2$	SELENITE (Gypsum) $CaSO_42(H_2O)$	SERPENTINE TALC SOAPSTONE (1) $H_4Mg_3Si_2O_9$ and (2) TALC or $H_2Mg_3(SiO_3)_4$
COLOR, STREAK AND WEIGHT	(1) White, colorless, gray, flesh-red, vitreous. Streak, white or colorless. Weight, 2.5 to 2.6 that of water. Insoluble in acids. (2) Varied opalescent, vitreous to pearly. Weight, 2.62 to 2.75. All are silicates of aluminum and one or more other metals.	(1) White to light green. (2) Green. (3) Dark green to black. Luster, vitreous. Streak, colorless. Weight, 3 to 3.3 times that of water. *Asbestos* is a fibrous variety and *nephrite* is a tough, compact "green stone."	Colorless to white, gray, yellow or brown, vitreous to pearly, soluble in hot hydrochloric acid. Weight, 2.32 times as heavy as water. Streak, colorless. Selenite, transparent crystal. Alabaster, white, fine grained, translucent. Rock gypsum, coarse.	(1) Olive to blackish green, yellowish green to white or translucent when thin, with a greasy, waxy or silky luster. Streak, colorless. Weight, 2.5 to 2.65 times that of water. (2) Green to gray, pearly to greasy. Weight, 2.8 times that of water.
HARDNESS, FRACTURE AND CRYSTALLIZATION	Hardness, (1) 6 to 6.5; (2) 6, softer than quartz. Cleavage, (1) splits in 2 directions, 90° angle; (2) basal perfect, oblique. Structure, (1) crystalline, cleavable, to granular; (2) massive; cleavable, crystals rare. Crystallization, (1) Monoclinic, (2) triclinic. Fracture, uneven; in glassy crystals of (1), it may be conchoidal.	Hardness, 5 to 6, may be scratched with glass. Cleavage, perfect, prismatic at 125°. The minerals are opaque, semi-translucent or sometimes transparent. Crystallization, monoclinic, prismatic. Tremolite breaks into splinters which pierce the skin. Actinolite commonly occurs as plates or blades in schists. Hornblende is in short crystals in some volcanic rocks.	Hardness, 2, may be scratched with the fingernail. Unusual tenacity being both flexible and able to be sliced. Some varieties are fibrous. Fracture is in 3 directions, leaving rhombic plates. In selenite, the largest face looks pearly, while the other two show conchoidal fracture in one and fibrous in the other. Crystallization, monoclinic.	Hardness, (1) 3 to 5, usually 4; (2) 1, may be scratched with fingernail. Poor conductors of heat and not attacked by acids. (1) may have tough, fibrous or flexible varieties and subconchoidal or splintery fracture. (2) Has basal cleavage and may occur in fibrous or other forms, flexible but not elastic. Crystallization, monoclinic but true crystals of (1) unknown.
GENERAL RECOGNITION CHARACTER AND HEAT EFFECTS	Fusible with difficulty. Simplest difference is oblique cleavage in (2) and right-angle cleavage in (1). Prominent cleavage of (1) shows no striations; of (2) almost always shows striations.	Fusible easily with blowpipe. Hornblende, the commonest, appears usually as opaque black parts of basalts, schists and granites. It has a definite cleavage, thus differing from black tourmaline, which it otherwise may resemble.	May form crystals over 5 feet long or appear as massive, fibrous, granular or earthy material and may be identified by its hardness, its luster and its solubility in hot hydrochloric acid.	(1) Infusible. (2) Fused with difficulty but some kinds become very hard when heated excessively and are used as tips on gas burners. Color and general softness, the greasy feel to (2), and the general luster, are good identification characters.
WHERE AND IN WHAT FORMATIONS FOUND	Orthoclase, a potassium feldspar, is found as sanidine in common eruptive rocks like trachyte and rhyolite. Another potassium feldspar, microcline, occurs in large masses in pegmatite and similar rocks. Plagioclase includes the usually white soda-feldspar, albite, the dark gray labradorite and the usually lighter-colored sodium and calcium feldspar oligoclase.	Associates are suggested above. In schists, hornblende is usually fibrous or in blades; in volcanic rocks, in short thick prisms. Nephrite, the "jade" of New Zealand is compact but asbestos is fibrous. This is not the commercial asbestos which is made mostly from serpentine. Amphiboles are usually distributed through rocks but not always so.	Found generally in beds sometimes of great thickness commonly in sedimentary rocks associated with salt, calcite, sulphur, pyrite, dolomite and quartz. Best beds of selenite in Utah, Texas, Mexico and France; of alabaster, in Italy; of satin spar in Siberia, England and Nevada. Rock gypsum more generally distributed.	(1) Serpentine marble of the tougher forms quarried in England, Italy, Ireland, France, Greece, New England, along the Hudson near New York, and at Philadelphia and Baltimore. Chrysotile, a fibrous variety, makes asbestos. (2) Talc as soapstone is quarried in Virginia and North Carolina; the fibrous talc in New York and foliated talc in Rhode Island.
USE AND COMMERCIAL ABUNDANCE	Feldspar constitutes about 60 percent of the earth's crust to a depth of 10 miles. Feldspars, with mica, form the softer parts of granites. They are used in making porcelain, as a source of aluminum. Some are of gem quality; some in glass industry and in pottery. Found in granites, gneisses and sandstones. Some are used in building stones.	Used associated with the rocks of which they are a part. While asbestos may have 18 inch fibers it is not commercially used. Some forms have semi-precious jewel qualities and are used in making various ornaments.	Most important use of gypsum in making plaster of paris, also a part of cement and of general building plaster and land plaster. Alabaster is used in making statuary and carvings of various sorts; and satin spar, in making of ornaments. School "chalk" is made of gypsum.	Serpentine is used as building stones and the fibrous variety chrysotile is spun into yarn to make fireproof fabrics, heating pipe covers, fireproof shingles, stove linings and the like. Talc in its tougher forms is used as soapstones for washtubs, switchboards, tables, toilets and tanks. In its fibrous form it is used as filler for paper and paints and, in foliated form, in cheap toilet powders.

Spying on the Grass Spider

By MILO R. CLARE

The mature grass spider (about three times enlarged), separated from the maze of low vegetation that is its normal habitat, is seen to be an alert upstanding individual.

The first web made by the young grass spider is an irregular network of silken threads. With continued additions the lower part of the network becomes a horizontal sheet into which drop insects that are intercepted by the threads above.

Few people are aware of the great abundance of spiders in their neighborhoods. This is because spiders are so secretive in their habits that we must detect their presence chiefly by the webs they erect. Yet many spiders do not spin webs at all, and, of those that do, the majority build structures of such surpassing delicacy that we pass them by without observing them. If, however, we arise early enough on a summer morning to see these webs when they are laden with dew, we will be amazed to discover a world almost covered with spider webs.

Prominent among these webs are those of the grass spider, *Agelena naevia*. This is probably our commonest spider, and it occurs nearly everywhere from the Atlantic to the Pacific. Were we to choose a national spider on the basis by which we selected a national flower, our choice might well be the grass spider.

Unlike the webs of many other spiders, which are practically unvarying in design and as perfectly executed by immature spiders as by seasoned adults, the web of the grass spider undergoes a development during the course of the season. Having selected a place of concealment in a crevice, or perhaps in the interior of a curled leaf, the very young spider proceeds to lay down in a nearby exposed sit-

Every time the spider traverses the horizontal sheet it reinforces it by laying down additional threads of silk. Thus it grows more definite and the irregular superstructure of threads gradually disappears. As the season progresses, the grass spider develops its funnel, attached to the main web. There it lurks ready to emerge and either consume any entrapped insect on the spot, or cut it loose and take it into the tube to be eaten later.

uation a criss-cross and formless maze of silken threads. This is the most primitive type of web conceivable, is intended to ensnare insect food, and is as inefficient as it is primitive. But it is merely a temporary expedient. Every time the spider ventures forth upon the web it deposits a fresh thread of silk, and thus soon converts the lower portion of the maze into a horizontal sheet-like structure. A large part of the original network persists, however, as a conspicuous feature of the web, appearing now as a superstructure of guy-lines and cables supporting the horizontal sheet. This superstructure lasts for some time and undoubtedly serves to arrest the flight of many passing insects, causing them to drop to the sheet below. With continued use the sheet grows more definite in character, whereas the superstructure is neglected and gradually disappears. Presently the web begins to take final form. On its excursions upon the sheet, the spider also extends its silken strands into its retreat at one side of the sheet, with the consequence that a tube is formed as an appendage to the sheet. Thus the entire web takes on the appearance of a lop-sided funnel. As the sum-

The grass spider spends most of the daylight hours within its tube, coming forth at night for web-building. Morning and evening, and often on cloudy days, it may be seen at the mouth of its tube.

The female grass spider adds the final touches to the egg sac, a task that takes twelve to eighteen hours. In the process her abdomen shrinks, for she builds into the egg sac both a large volume of eggs and a vast yardage of silk.

The egg sacs of the grass spiders are most frequently placed on leaves. In the sac shown here part of the cover sheet of silk has been removed, as well as several layers of the silk that forms the roof of the cup in which the eggs are encased. The silken cradle is waterproof and provides the eggs every possible protection. Usually the eggs hatch in the fall, but if the sac is made late in the season the spiderlings will not appear until the spring.

mer advances the funnel becomes more symmetrical, the retreat tube increases in length, and the sheet is spread more widely. Late in the season the sheet may be two feet in diameter and the stem of the funnel as much as eight or nine inches long. The spider lurks within the tube, at or near its entrance. From this position it can make quick assaults on luckless insects that fall upon the sheet. If too violently disturbed, it will run out of the lower end of the tube and conceal itself amid the litter covering the ground.

In early fall the males desert their webs to seek out the females. The egg-sacs may be found from the middle of September onward, hidden in crevices or attached to leaves. In making the egg-sac the female spins a foundation of silk on which she deposits about 200 pearly eggs. She then enfolds them in several layers of loose-spun sheeting. Finally, over all, she places a heavy silken cover. When the egg-sac is formed on a leaf, not infrequently another leaf is bound down over the surface of the egg-sac to protect it more adequately.

In the milder parts of the country the spiderlings hatch out in the fall months; elsewhere, the eggs continue through the winter and produce a spring crop of young. Whether hatched in the fall or spring, each spiderling selects the first warm sunshiny day to enact a strange practice of a strange race. From its spinnerets issue long threads of silk that are arranged into a sort of balloon, which, with the help of ascending currents, enables its passenger to rise to the air-lanes of travel, there to be borne willy-nilly far from its place of birth. When the impulse to travel is satisfied, the support is reeled in and the rider descends to take up a new abode.

★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

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RESOURCES OF THE PACIFIC

As a leading article this month, Nature Magazine presents a story of the sea otter. It tells of the recent discovery of a pitiful remnant of this once great resource of the Pacific Ocean; a sea mammal that formerly had great economic importance as a source of valuable fur, and which was almost exterminated by over-exploitation. With rigid protection over a period of years, the sea otter might come back to at least a suggestion of its former numbers. But this protection must be international; without exception; absolute.

When we consider the fate of the sea otter, we may logically turn attention to consideration of other invaluable resources of the Pacific—the salmon of British Columbia, Alaska and our own Northwest, and the fisheries of Hawaii. Both are seriously menaced, and both must be administered in accordance with a plan of conservation based upon scientific knowledge.

The problem of the salmon is an international one, involving diplomatic relations, and potential with conflict. But we are heartened by the fact that, through an agreement between the United States and Canada, which resulted in the creation of the International Fisheries Commission, the seriously depleted halibut resources of the coast, from California to the Bering Sea, were restored. Also, a policy of salmon fishing was established designed to assure the perpetuation of the supply.

A complicating factor has arisen, however, with the appearance off Alaska of Japanese fishing boats and floating canneries. Whether this shift came because of the protest of the Japanese salmon monopoly on the Siberian coast, or because of the failure of Russia to renew Japanese fishing rights on that coast matters little. In any event it created a serious menace to America's existing program of conservation and use. Informed individuals are convinced that continuation of the unrestricted and destructive fishing by the Japanese will mean the destruction of our salmon industry in a decade. Together the United States and Canada have spent time and money, and have applied restrictions to perpetuate the supply, yet precedent, if not actual law, limits their jurisdiction to the "three-mile limit."

There is a substantial and sound body of opinion, however, that considers the three-mile limitation unsupported by actual international law, or general acceptance. It is further pointed out that since the salmon are reared in North American lakes and streams, Canada and the United States have special rights to these fisheries that other nationals must respect. Also the relatively shallow region of the continental shelf, which extends a few miles into the ocean from the California coast, but broadens to about one hundred miles off Alaska, is the normal feeding area for the salmon, and is, in reality, a part of this continent.

In any event, we are confronted by no theoretical problem but one that is practical and demands immediate action. The solution should come through diplomatic channels and should be sought without delay. Further, the United States and Canada should let it be known without equivocation that they regard their special interests in these fisheries as entitling them to maintain their present policies in salmon conservation.

Another fisheries problem of the Pacific relates to the fish resources of Hawaii, and to the urgent need both of knowledge of existing conditions and proper supervision of the annual catch. A look at the past must convince anyone that the fishes of the oceans are not inexhaustible; that unrestricted harvesting anywhere cannot go on indefinitely.

Before he retired as United States Commissioner of Fisheries, Frank T. Bell recommended a thorough investigation of the fisheries of Hawaii and adjacent waters. He proposed that this study be directed toward rehabilitation, and "for more complete exploitation of resources capable of fuller utilization." He also stressed the need of studying more efficient methods of fishing to assure greater profit and more employment.

There is, in fact, more of the commercial and less of

the conservational in Mr. Bell's proposals. This is consistent with Mr. Bell's general attitude as Commissioner. Fundamentally, however, it is right. An *unbiased,* thorough and scientific study of the ecology of north-Pacific marine life should be made, and made immediately. On the basis of these findings a program of development and use, based upon sound conservation and maintenance of an adequate supply, should be established. It is also interesting to recall that about twenty years ago a well-planned study of the entire marine resources of the north Pacific was urged by a group of eminent American scientists.

We cannot continue to play fast and loose with the finny resources of the seas as we have done with the resources of the land. If we go blindly on exploiting they will follow the sad course of the mammals of the sea—the whales; the seals; the sea otters.

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"VERMIN" HUNTS IN WASHINGTON

Truth, proved facts and scientific knowledge always must fight an uphill battle to overcome ignorance, misinformation and just plain cussedness. In no instance is this better demonstrated than in the struggle to save our hawks and owls, and other so-called "vermin", from the ignorant drives against them.

In many parts of the country distinct progress has been made. Intelligent sportsmen have studied and accepted the incontrovertible proof that the majority of the species of hawks and owls perform an invaluable service in the scheme of Nature. Informed farmers have accepted the facts that these birds are important allies in checking injurious rodents and insects. Truly conservation-minded game officials have sought the passage of laws protecting these valuable bird species, and have demanded the enforcement of these laws.

But, despite this progress in many regions, there still remain states where stupidity and ignorance continue to prevail; where facts are ignored in order that members of sportsmen's groups may have something to shoot at out of season. Accurate information about the feeding habits of these birds has, therefore, been zealously ignored. "Vermin" hunts go on, stimulated by bounties, contests and prizes, the latter often donated by arms and ammunition dealers.

Of all the states the State of Washington is perhaps in the forefront in the number and character of its "vermin" hunts, predatory drives and bounty payments. On the statute books of the State the beneficial hawks and owls are protected, but the State Game Commission is making no real effort to enforce the law. If it were, the widespread hunts would not be permitted, if only because not one hunter in a hundred can accurately identify the species of hawks and owls, least of all on the wing.

To our knowledge thirty-eight "vermin" hunts are being conducted by groups in Washington State. There are probably more. Most of these are under the auspices of sportsmen's associations. Several are sponsored by ammunition dealers. One high school boys' club, one woman's club and one Grange also conduct contests. And we are surprised to note that one chapter of the Izaak Walton League not only conducts such a vermin contest and pays bounties, but includes on its proscribed list the great blue heron, a bird protected both by State and federal law.

It is interesting to note, as examples of the ignorance and misinformation on which these drives are based, that the Okanogan Wildlife Council includes eagles in its hunt. The bird is protected by State law. The Tonasket Game Protective Association pays a twenty-five cent bounty on large hawks, the most beneficial species. The Pend Oreille Valley Sportsmen's Association proscribes sparrow hawks, which are protected by State law. Almost without exception the terms of the contests, or the listing of bounties paid, proscribe all hawks and make no distinction as to species. Under State law all hawks but the three accipiters—the goshawk, Cooper's hawk and sharp-shin—and three falcons—duck and pigeon hawks and prairie falcon—are protected. The great horned owl is the only unprotected owl. Points are given, or bounties paid, for "hawk and owl eggs and young" regardless of species. In practically every instance only the feet of the hawks and owls are required for credit, thus making it impossible for the judges to discriminate between the species.

That the Washington State Game Commission takes no steps to educate the organized sportsmen of the State, but, rather, tacitly encourages the "vermin" hunts by inaction, is discouraging to conservationists and to all informed sportsmen. The facts of the food habits of hawks and owls are established beyond argument. The great economic benefit of most species is proved. The continuance of these predator control contests in the name of conservation is a travesty.

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WATERFOWL SEASON ★ ★

One less goose per day per hunter—this sums up the difference between migratory waterfowl hunting regulations in 1939 and 1938. Fortunately the bans on the use of live decoys and hunting over baited waters are retained, and the dubious situation of the goose population is recognized by cutting the bag limit from five to four.

Those hoping for assurance of more rapid increase in the naturally-produced supply of birds, however, will find little comfort in the regulations. The zone system is retained, together with the 45-day open seasons, forcing many of the waterfowl to run a gauntlet of shooting of more than four months duration. No protection is afforded the canvasback, redhead, ruddy and bufflehead ducks. The two-day possession limit is continued.

Reports indicated a modest increase in numbers during a favorable breeding season. Perhaps we should find solace that this increase has not been reflected in an even more liberal set of regulations. We are not, however, as resigned as that and can only regret that real restoration of waterfowl numbers is to be still further delayed.

"A Soft Answer..."

It not only turneth away wrath
but may be a force for good

By BERTHA CONRAD HALL

Photographs by Frank L. Du Mond, Grand Rapids Public Museum

NATURE PREPARED A FEEDING STATION
And the young bird feeders take advantage of the hollow in the old tree stump

IT ALL started over a blue racer. We had found it taking a siesta in the October sunshine not far from where carpenters and painters were renovating our "dream home". After we had explained to our four daughters that the snake was harmless, and would be a good friend to have in our projected perennial garden, "Blue" was accepted into the family.

One afternoon, not long after, Connie rushed in to report breathlessly that some boys, cutting cross-lots on their way home from school, had killed "Blue". I found him draped over a low limb of one of our oaks, quite dead. And my protest to the boys was met with catcalls, followed by a shower of pebbles.

Next, by way of the children's "grapevine", I learned that a favorite pastime of some local small boys was to insert straws in baby birds and blow them up until they burst. Clearly there was need for action, so I set out to "woo" the boys. Plates of fudge "just happened" to be on hand; bacon-wrapped hot dogs, cooked in an outdoor fireplace, proved popular; a marshmallow roast on a warm evening was a high point. Seed for my garden began to be brought in appreciation. Finally, one little fellow said:

"Gee, Mrs. Hall, we're sure sorry we killed that snake. But he might 'a killed you if he'd 'a bitten you."

This provided an opening for a Nature discussion, and by spring I had to work in shifts the helpers who came to clean leaves from the rock garden. The resting ones watched the newly-arrived spring birds. They reported new activities in the bird world, and watched, through my husband's treasured binoculars, a strutting male grebe in the little swamp. Billy, who admitted he had killed a grebe last year with a huge slingshot, spied the first red-headed woodpecker. The next day he came to me and gravely handed me the slingshot.

"I guess I'm all through with killing birds—even sparrows. Somehow I like to look at 'em through Mr. Hall's glasses better," he volunteered.

Progress was really being made, and it was at the meeting of the Michigan Audubon Society in Grand Rapids, on the outskirts of which we live, that revealed the next step. Margaret Gross, the secretary, suggested that we form a recruit group for the Audubon Society. Miss Mary Peterson, teacher of the fifth and sixth grades at the Oakview School, had been thinking along the same line. So, with the approval of the school board, members were invited, annual dues to be fifteen cents. Eight, I thought, would be all we might expect. Twenty-six members joined and paid dues at the first meeting, and the first and second grades sought to trail along on the first hike that followed the meeting. They were so plainly broken-hearted at being turned back to school that an overflow hike had to be organized immediately.

MANY FEEDING STATIONS WERE SET UP
These were kept supplied with food during the season of sparse supply

From this first beginning membership and interest have grown. Although the Oakview School has only about 150 children, an attendance of 125 at meetings is common. The first Christmas there was a tree, all presents being for the birds. There were boxes of screened gravel, bread crumbs, sunflower heads, flower seeds,

chicken feed, oatmeal, corn for pheasants and a sheaf of wheat to put up on a pole. Similar events have marked succeeding Christmases.

At the first Christmas party each member was given an opportunity to report bird experiences. One boy popped up with a question.

"Our next door neighbor shot a hen pheasant yesterday right by my earcorn on the fence by the orchard," he said. "What shall I do?"

It was Christmas. The pheasant season was long over and hen pheasants were protected anyway. There was a heated discussion, with suggestions of direct action. So I closed the door and we carefully worked out a program. We would not report violations of neighbors but would ask the fathers and mothers to help stop violations in any way they thought best. It was a plan that has worked wonders.

Beyond bird study, feeding and other avian attentions, we set ourselves a greater goal. It was to get permission to post a sanctuary, taking in our own swamps and woodlots and other adjacent area. The president of the school board, Irving Woodworth, dedicated forty-five acres. Then, with the weight of child opinion and influence an important factor, other lot owners were reached and their cooperation enlisted. The children rejected the idea of a state sanctuary with metal signs furnished by the conservation department. They wanted their own signs, bearing the name of the Oakview Audubon Recruit Group and the lot owners. The sanctuary is now a fact, and fathers and grandfathers have been busy wielding paint brushes on the signs.

During the two years of working for the sanctuary many bird feeding stations were erected and kept supplied with food. Houses were put up. Mothers, not wanting to be outdone by the youngsters, asked for a mothers' walking group. Parents contributed to build up a complete file of Nature Magazines and a library of books. Bird study has been placed on the schedule of all of the teachers. Children from Grand Rapids have come for bird study in the Oakview Sanctuary. Various programs have been put on, including one parent-teacher-association meeting that proved such a success that the entertainment had to be given twice to care for the overflow.

So successful and so sound has been the growth of this work that the groups became too large for Miss Peterson and me to handle. So four eighth-graders were chosen as associate leaders in charge of hikes. And one of these eighth-grade boys is the youngster who killed the blue racer because no one had told him any better.

The Kookaburra

By EDITH M. LAING

Among Australia's interesting postal pictures is one showing the laughing kingfisher, peculiar to that country. Because of its strange calls this bird was named kookaburra by the aborigines, and by the colonists, laughing jackass.

Those poetical legends that account for the origin of kingfishers—of the romance of Ceyx, son of the Morning Star, and Halcyone, daughter of Aeolus, the wind; and the tale of the kingfisher that, released from its cramped quarters in the Ark of Noah, flew so high that its back took on the color of the sky, and its breast was scorched brown by the sun—these pertain to the typical kingfishers, the real fishers that live by the waterside in many a country. The bird that now concerns us, however, belongs to a group whose food habits allow them to live in the woods, or even in semi-desert areas. These are the wood-kingfishers or king-hunters, which inhabit various island groups in Oceania. There are many species, some of beautiful color and all with strange habits. With its share of the latter traits, but with little beauty, is the kookaburra. Its back is dull brown, changing to greenish-blue toward the tail. A wide collar of white encircles the neck, and this color continues over most of the head to the eyes, and down over the breast. The tail feathers are tawny, with black bars and white tips. It is a truly distinctive member of the clan.

The scientists call this bird *Dacelo gigas,* which means, of course, the great kingfisher. It has a rather extensive range in Australia, being equally at home in patches of scrub on the drought-stricken plains of the interior, and in the verdant bush of the highlands. Nor is it restricted as to diet, for a variety of insects, lizards, snakes, crabs and mice find a place on its menu. Its favorite nesting place is a well-hidden natural cavity in a tree, and here it deposits its white eggs.

From the profile view on the stamp one gets the impression of a gay and roguish disposition. How natural for these comical birds in their unfettered state! But when seen as wretched captives hunched on a perch in a zoo, every feather voices utter dejection, while listless eyes, the light of liberty forever dimmed, bespeak the bitterness of a broken spirit.

But let an Australian naturalist, Wheelwright, give us a happy picture of our irrepressible bird, which the settlers sometimes call the bushman's clock: "About an hour before sunrise the bushman is awakened by the most discordant sounds, as if a troop of fiends were shouting, whooping, and laughing around him all in one wild chorus. This is the morning song of the laughing jackass warning his feathered mates that daybreak is at hand. At noon the same wild laugh is heard, and as the sun sinks into the West, it again rings through the forest."

Things to Think About

Prizes totalling more than six hundred dollars were awarded to inventors and trappers by the American Humane Association in its 1939 humane trap contest. Through these contests, conducted for the past twelve years, a world-wide search has been made for devices that will assure the trapping of wild animals with a minimum of attendant suffering. The Association's wildlife director, W. E. Sanderson, declares that "years of research have brought us nearer our goal of enlightening the world concerning true conservation and the justice due our wild life."

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A most practical and helpful little loose-leaf booklet entitled *Conservation Guide* has been published by the conservation committee of the Garden Club of America, 598 Madison Avenue, New York City. It is divided into three parts—education, planning, preservation—and serves as an aid to local conservation committee leaders in suggesting the general program and in advising where to turn for additional material.

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Twenty new national wildlife refuges have been added to the U. S. Bureau of Biological Survey system of refuges in North Dakota. These new areas brought 35,495 additional acres under refuge management, while 11,135 acres more have been added to the existing Long Lake Refuge in that state. These areas are not only important for migratory waterfowl, but also serve as water conservation projects.

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Careful removal of eiderdown from nests of the incubating eider duck without interrupting the raising of the family is providing a new industry and aiding conservation of these birds in Quebec Province, Canada. A source of much-needed financial aid to residents of the regions where these ducks nest, the stringent laws protecting the birds are further aided by the fact that the more eiders there are the more down. Hence those collecting the down are individual game wardens. There has been a five-fold increase in the amount of down gathered since 1933.

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The Problem of the Roadside is the title of a report brought out by the New England Regional Planning Commission, 2100 Federal Building, Boston, as publication No. 56 of that body. The report regards rural zoning as one of the most effective means of roadside control, but points out that there are legal problems to be solved in order to make this effective in New England. The report deals rather gently with the worst offender along the roadsides—the billboards—confining its comments largely to factual information on the progress of billboard control thus far. A much more exhaustive analysis of this question is to be found in the American Nature Association *Quarterly Bulletin,* Volume 2, Number 2, available on request.

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Many young squirrels have died of starvation in Illinois this year due to the ill-advised and uninformed action of the State Legislature. By legislative fiat the open season on squirrels was set for July 15 in the southern part of the state, and for August 1 in the central and northern zones. The season was thus advanced from September 1, ignoring the fact that in usual warm summers squirrels raise two families, one in the early spring and the other in late July. Thus the many mother squirrels shot during the early season have left unfed young to perish. The Director of Conservation states that he was not consulted about this action, nor was he informed of the matter until the legislation had been approved by the Governor.

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The Appellate Division of the Third Department of the Supreme Court of the State of New York has upheld as constitutional the provisions of conservation law regulating the erection of billboards within Adirondack Park. This law was passed to protect the beauty of this area from unsightly exploitation of this sort, and was contested through a case brought by the State against Joseph S. Sterling, who defied the law by erecting several large signboards.

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Homer W. Wood, California newspaper publisher, inveighs against the National Park Service because it does not kill off the predatory animals in the National Parks. He cites the fact that in the Canadian National Parks predator control is carried on, and that our own National Parks, without such a policy, cannot function as game refuges. Mr. Wood loses sight of two things. The first is that the National Parks of Canada are not founded on the same basis as our own, but are designed to serve a wider recreational purpose, including hunting, much as are our National Forests. Secondly, our National Parks are not established as game refuges but as wildlife sanctuaries. There is a distinct difference between the two, although both terms are too often mistakenly used. For example, the game refuges of the United States Biological Survey are often called sanctuaries despite the fact that in most of them there are areas of public shooting grounds available for hunting during open seasons. A game refuge is an area with hunting significance and a game management philosophy. A wildlife sanctuary is an area where all wildlife enjoys protection all of the time and exists under undisturbed conditions of Nature. Mr. Wood, it

appears, is a game conservationist instead of a wildlife conservationist, and looks at the National Parks as reservoirs from which game should flow into areas where it can be shot. Hence he is interested primarily in the game animals within the Parks. Wildlife conservationists have a broader interest and will uphold the existing policies of the National Park Service with respect to predator control.

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On the grounds of the Greenhead Hunting Club of Fallon, Nevada, leased for hunting from the Truckee-Carson Irrigation district, 10,263 ducks were killed in the 45-day season of 1938, compared with 4440 in the 30-day season of 1937, according to information published in the *Fallon Standard* just after the close of the 1938 shooting season. The average daily bag was 7.1 ducks per hunter. On five days during the season all hunters killed the legal limit. Yet the caretaker of the club wants a three-day-a-week season, to extend from September 1 to January 1. Two flocks of swans observed in flight numbered 85 and a little more than 100 respectively. One hunter who boasted of the largest goose he had ever shot, which reached from his shoulder to the ground, had, undoubtedly, killed a swan, but the bird was not seen by the caretaker. Evidently the hunters' bags are not always closely checked as to species.

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"The intelligence of the American people is insulted by the thousands of billboards which scream at them for mile after mile," declares the editor of *Florida Magazine* in the leading editorial in his August issue. Proud of his state and the beauties with which it is endowed, he strikes out against this condition in an effective and thought-provoking statement, which we reproduce, in major part, here. Says Editor Jess G. Lantz:

"Just how long are the people of Florida going to allow their beautiful highways and traffic thoroughfares to be cluttered up with nondescript signs and billboards? Big ones, little ones! Old ones! Ugly ones! Glaring, screaming billboards! Ragged, battered and bent signs. They leer at you from trees and yell at you from ditches—they come rushing at you from over the hilltops and gnaw at your vitals from around curves—steam heated . . . liver pills . . . inner spring . . . baffle cars . . . b-o tonic . . . the whatis hotel . . . squirma shav . . . and by the time you've gone a few miles your head is in such a whirl trying to ignore the obnoxious things and keep from reading them, that before you know it you start dodging them as if they were racing toward you.

"Billboards and signs on the highways are a menace to safety and a curse on our virgin forests and broad landscapes. Besides that, they are a travesty on the intelligence of the American people. Everywhere you go these glaring illegitimate children of the graphic arts are practically 'rammed down your throat' in a manner that is most distasteful to an intelligent person.

"Highway and automobile safety has lately received a great amount of attention in all sections of the country, but the sign and billboard nuisance goes on its merry way unmolested. In Florida many of these huge billboards are so placed that they are a direct obstruction to the vision of motorists. Even those that are farther removed from the roadbed are still a menace to safety because of the fact that they ofttimes divert the attention of drivers from their all-important responsibility of operating their vehicles.

"We believe the large users of billboard space in Florida would be happy to have the nuisances removed from the highways. Most of them probably use this kind of advertising because some competitor started it, and they would be glad to be relieved of this expensive method of destroying the beauty of Florida's highways. A very few of the signs—those which are solely for the purpose of directing motorists over shorter or better routes—are excusable. We believe the State Road Department should be given authority to limit the size and define locations of signs and billboards—let Florida lead the Nation in a program of true highway beautification."

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Receipts from the sale of forest products from the 158 National Forests during the fiscal year ending June 30, 1939, amounted to $4,870,516, according to a report by the United States Forest Service. This represents an increase of more than a quarter of a million dollars over the figure for last year but is still about two million dollars less than the 1930 record. Timber sales accounted for more than half the total revenue last year. Grazing fees were down due to lower market prices for lamb, wool, mutton and beef. In fact, over the years National Forest receipts have proved a quite accurate indicator of general economic conditions.

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During the year that ended June 30 more than 1,600,000 acres were added to the scenic, recreational and historical areas administered by the National Park Service. This brings the total acreage to 20,817,228 acres as of July 1, 1939. The extension of the Glacier Bay National Monument, which was increased by the addition of 1,124,720 acres, and the enlargement of Carlsbad Cavern National Park from 10,080 acres to 49,568 acres, were the most important additions. Badlands National Monument of 150,103 acres was another important increase.

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To provide an item on the menu of the official banquet tendered the British King and Queen in Quebec more than two thousand slate-colored juncos were slaughtered. Such an act was in direct violation of decency and of the spirit, if not the letter, of the Migratory Bird Treaty Act between Canada and the United States. Protests arose even before the banquet was served, and it is understood that Their Majesties did not partake of this course. More protests have followed, and it is hoped that they will be in such volume as to preclude any repetition of such a practice.

A Hallowe'en Brew

We have received numerous requests for suggestions of sources of simple Nature plays. Survey of the field reveals them to be scarce. So, with the hope of getting reaction as to the usefulness of this type of material, we present herewith "Hallowe'en Brew". It is the result of collaboration between members of the sixth grade groups of the Princeton, New Jersey, elementary schools, and their teacher of Nature study, Dorothy M. Compton. Other groups using this for a school play may wish to elaborate it, but this Princeton version offers a working basis.

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Characters: 1st Witch; 2nd Witch; 3rd Witch; 1st Black Cat (Binzing); 2nd Black Cat (Coal Black); 3rd Black Cat (Jo-Jo); Owl (Spooky); Spider; Two Bats; 1st Child; 2nd Child; 3rd Child; 4th Child; 5th Child.

Scene: A witches' hut. Spider web constructed of heavy black yarn in left corner. Spider stands in web, occasionally moving arms and legs as if weaving. Caldron hanging from tripod in center stage. Owl on stump in right corner. Bats resting against curtains in rear, occasionally flitting wings. Light from three pumpkin Jack-o'-lanterns, and moon overhead.

As curtain opens, Spider, Owl, and Bats are alone on stage.

SPIDER: Tonight the old witch makes her brew!

OWL: Yes, I know. This is Hallowe'en.

BAT: Here she comes! Sh! Sh!

(*Enter 1st Witch on broomstick, with her black cat*)

1ST WITCH: What are you whispering about?

BAT: Oh—er—ah—we were talking about the delicious brew you make. Isn't this the night? It's Hallowe'en, you know.

1ST WITCH: Yes, yes! I know. It is time to begin the brew. Come sisters!

(*Enter two more witches and their black cats. The three witches walk round and round the caldron, peering into it*)

1ST WITCH (*stirring*): Round and round our magic brew. Stir until it is very black. Ha—ha—ha—ha.

2ND WITCH (*shaking something from a bag into caldron and stirring*): Put in warts of a toad, an eel, and a snail to make the people quiver and quail. Ha—ha—ha—ha.

3RD WITCH (*shaking something from her bag and stirring*): Put in some slimy snakes and a mouse or two, stir round and round our magic brew. Ha—ha—ha—ha.

(*1st Witch tastes brew*)

2ND WITCH: How is the brew, sister?

1ST WITCH: It is not rich enough. We must put in more. Binzing, come here. (*Cat comes up, meowing*) Binzing, go get beetles and flies and elephants' ears. We also want some more bats' livers. Hurry back, because our brew must be done before midnight.

BINZING: Yes, Old Witch. Meow! (*Goes off*)

2ND WITCH: Coal Black, come here. (*Cat comes*) Go get twenty rotten eggs.

COAL BLACK: Yes, yes, Old Witch. I'll get six dead rats, too—meow—to put in this delicious brew.

2ND WITCH: Be off with you and get them quickly. (*Cat goes off*)

3RD WITCH: Jo-Jo, come here. We need lots more scary animals to put in our Hallowe'en brew. Jump on my broomstick and fly quickly. Bring back some squirming worms, a rabbit's nose, a lizard's tail, and a monkey's toes. (*Cat goes off*)

1ST WITCH: Wake up, bats. Hallowe'en is here. It is the time to scare people. What are you going to do tonight?

BAT: That's easy. We shall flit around and swoop down at people and make nests in their hair.

2ND WITCH: Good, bats. We depend on you to scare lots of people.

(*Spooky hoots*)

3RD WITCH: What's the matter, Spooky?

OWL: Shall I scare people, too? I can hoot under people's windows and make them think they are going to die. Like this—(*Hoots*)

3RD WITCH: Good, Spooky. We must remember to tell the dogs, too. They must howl and howl to make people think someone in their house will die.

1ST WITCH: Here come the cats. On with the cooking. (*Enter cats with sacks of things*)

2ND WITCH (*emptying sacks into caldron*): Perfume of skunk, poison of rattlesnake, crawly caterpillars, and thousand-legged worms, fall into our pot. Ha—ha—ha—ha. (*Tastes brew*)

3RD WITCH: How is the brew now, sister?

2ND WITCH: Better, better, better. But it still needs more. Some of your poison, O Spider. (*Spider spits into caldron*) And we forgot the frogs' legs to sweeten the brew. A pig's curly tail would make it taste good, too. (*Pulls these from her pocket and drops them in, too*) Now stir it with the black cats' tails.

(*Cats stir while witches recite*)

THREE WITCHES: Stir—stir—stir, bubble—bubble—boil, dragons' blood and livers of bats, stirred and mixed by three black cats. Stir—stir—stir.

1ST WITCH: Ah, how rare this brew will taste! (*All taste*) The brew is done. Now listen, all you animals. Do you know your work for tonight? Bats, you are ready. Owl, you are, too. Black cats?

BINZING: Yes, Old Witch. We shall yowl and yowl on people's back fences. (*Yowls*)

COAL BLACK: And we shall run across their paths.

JO-JO: And they will have bad luck. (*All cats meow*)

3RD WITCH: Good, Cats. Now we must round up all the other things people are afraid of. We must find the dragon flies and tell them to sew up people's ears and doctor the snakes. People call them darning needles and snake doctors. Ha—ha—ha—ha.

2ND WITCH: Yes, and the mice to run up the ladies' skirts and scare them.

1ST WITCH: And the toads to give them warts. (*All the witches laugh*) We shall scare everyone this Hallowe'en. You animals watch this brew while we call the rest. (*Witches go off*)

(*Left alone, the bats flit about, squeaking. Spider spits again in brew. Cats play. Voice of child is heard off stage*)

1ST CHILD: We had better hurry or we will be late for Janet's party.

BAT: Here come some children. Now is our chance. Let's practice our pranks on them and see if we can scare them.

(*Enter five children, dressed for Hallowe'en party. Cat yowls and runs in front of them as they enter*)

2ND CHILD: Oh, there's a black cat! It ran right in front of us. Now we'll have bad luck.

3RD CHILD: Nonsense. You don't believe that old superstition, do you? Black cats are no different from white or gray or any other cats. They haven't anything to do with luck. Let's hurry. (*Owl hoots*)

4TH CHILD: What was that? I'm scared!

5TH CHILD: Scared of an owl hoot! Silly girl! (*Laughs*)

4TH CHILD: Now I *know* we'll have bad luck. When an owl hoots it means someone will die.

5TH CHILD: Don't be silly. An owl hoot might mean a mouse or a rat would die, if the owl could catch them, but they don't hurt people.

4TH CHILD: Well I don't like that sound and I'm afraid!

(*Bats flit close to children*)

2ND CHILD: Look out! There are some bats! (*Puts both hands over head*) Why didn't I wear a hat? They'll make nests in my curls!

1ST CHILD: You're crazy. Bats don't make nests in people's hair. (*They spy caldron*) Say, what's that thing? Where are we? This *is* a spooky place!

(*Enter three witches*)

1ST WITCH: Well, well, well. We have some visitors in our witches' hut. Are you thirsty, my dears? We have been making a delicious drink for Hallowe'en. Come right up and have some.

4TH CHILD (*Looks in*): It's all black. And it smells terrible. I don't think I want any.

2ND WITCH: Oh, yes, you do. *Drink* it, or you'll wish you had. (*Laughs. Makes her drink*)

4TH CHILD: Ugh! It tastes like medicine. (*Peers into caldron again*) There's a toad in it! Will I get warts inside me? You get warts on your hands if you pick up a toad.

3RD CHILD: There you go telling a foolish story again. No such thing! I *play* with toads and I never had a wart in my life. Who told you such silly tales? (*Looks in caldron and picks out a cardboard picture of a toad*) Look, Stupid, this is only a picture of a toad. Someone's playing tricks on us!

1ST WITCH (*Takes off mask and laughs naturally*): Hello, everybody! How do you like the surprise? Weren't you scared? I'll bet you never expected to find a witches' hut when you came to the party!

3RD CHILD: It's Janet! You surely did fool us. Who are these witches?

JANET: Oh, Alice and Mary. (*All remove masks, including witches' animals. General hellos*)

2ND CHILD: Gee, I'm glad it's not true. I *was* scared of those bats. Real bats do make nests in your hair, don't they?

ALICE: Of course they don't, silly. They just fly around and eat mosquitoes and other insects.

4TH CHILD: And toads don't give warts?

MARY: No, foolish. The warts have a bad tasting stuff in them to protect the toads from being eaten by their enemies, but they can't give warts to anyone else.

4TH CHILD: Say, what was in that awful stuff you made me drink?

JANET: Oh—lizards' tails and dragons' blood and darning needles and elephants' ears and dead rats and—

4TH CHILD: You're just fooling. What was it really?

JANET: Just a lot of soft drinks mixed up and some salt to make it taste funny and some garlic to make it smell. It won't hurt you.

ALICE: Do you know some people believe these queer stories about the animals? But they are really our good friends. A dragon fly can't sew ears or anything, but it catches lots of insects and so does the toad. And snakes are

not slimy. Many of them are very useful. People should not kill these animals.

JANET: That's why we put them in our witches' play for the party. But let's go in the house now. We are going to tell fortunes and bob for apples and have some ice-cream. (*All go off*)

CURTAIN

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Origin of Primitive Indian Paints Proved

Totem pole restoration by the C.C.C. turns to Nature for tints and pigments

By CHARLES G. BURDICK

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HERETOFORE some mystery has surrounded the exact nature and origin of the paints used by the aborigines of Alaska for decorating totem poles, war canoes, and other articles.

The question of use of modern commercial paint, *versus* that used by primitive natives, was brought up in connection with the Totem Pole restoration projects now being carried on in southeastern Alaska by the Civilian Conservation Corps. Since the natives are being employed on this work, and are keenly interested in seeing the poles restored according to ancient Indian customs, it was not difficult to obtain the desired information.

Pigments are obtained from clay and pulverized rocks. Red clay from Revillagigedo Island is used for red coloring, while rocks from Cape Fox and Annette Island provide blue, green, and black.

With the desire to give these pigments a trial, expeditions have been sent out to gather the necessary material. Crushed salmon eggs are used for the binder.

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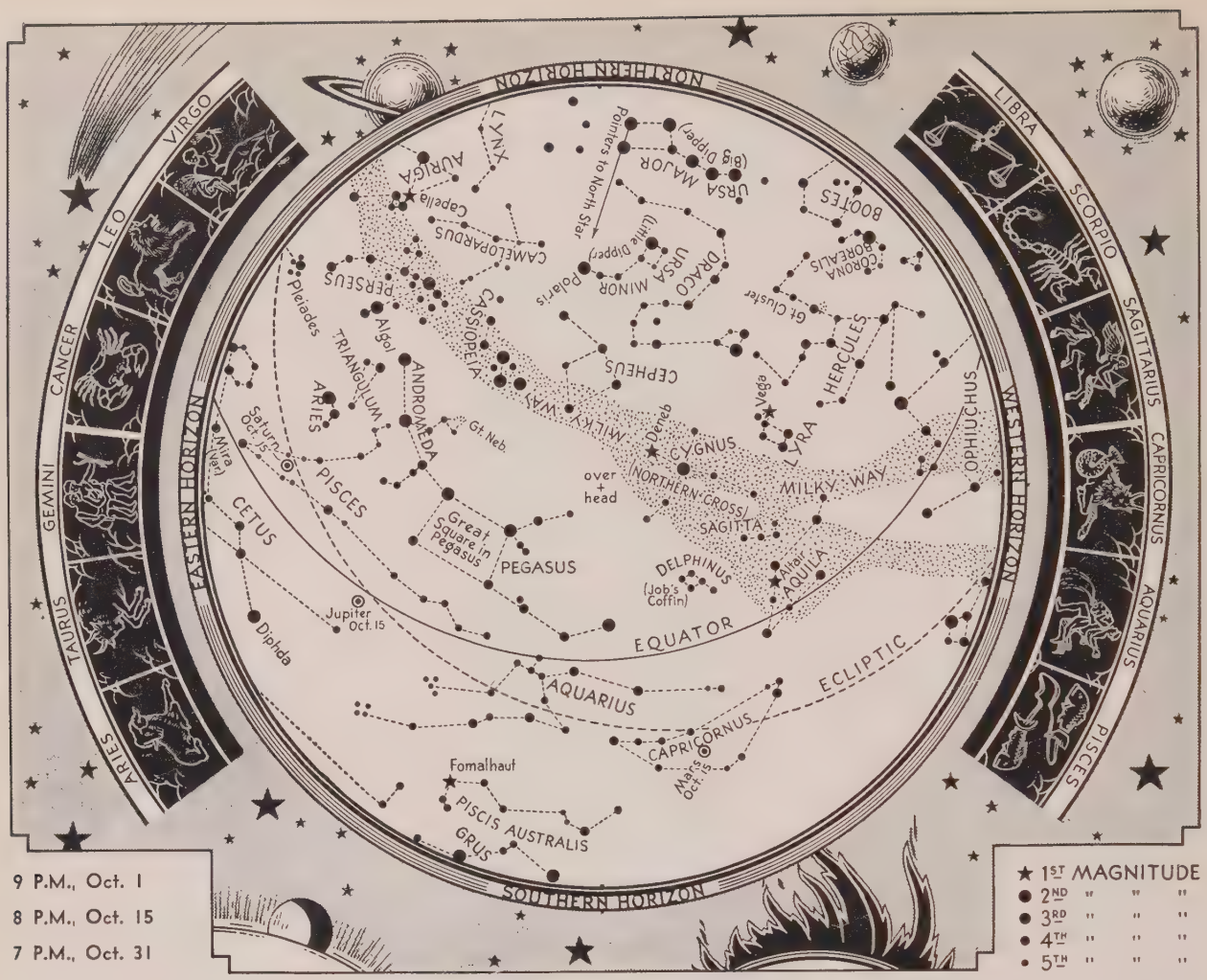
A Catbird Friend

By ELIZABETH B. HARTSHORN

WE CALLED her Mary for no special reason. She was a catbird who became not only a friend but who also brought moments of happiness to one who could not see her. We won Mary's friendship with raisins, for which she would come at our call and repay us with pert poses and serenades.

After eighteen years of perfect eyesight my friend was left blind by a severe illness. It sometimes seemed as though the catbird realized this, for when she flew away she would often touch my friend's cheek with her wing as though in friendly goodbye. Once when my friend was alone on the piazza Mary came and perched on her hand, staying for several moments and singing to her.

One morning Mary brought a youngster with her as though to let it see how it was to feed from human hands. During a severe electrical storm, the catbird perched close to the window as if seeking comfort and company. Wherever we moved our chairs about the lawn Mary would follow. One week of almost steady rain brought the bird to the porch several times, whence she called to us for raisins. When the catbird family was fully grown, mother and children turned from raisins to insects and berries. She had left a happy memory of bird friendliness.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

THE ZODIAC

By ISABEL M. LEWIS

OFTEN one will find it helpful in the study of the heavens to keep in mind the fact that the sun, moon, and all of the planets will be found always within a narrow zone, or belt, in the heavens. This is known as the zodiac or "zone of animals", so-named because all of its constellations represent living creatures with the exception of Libra, The Scales, which was formed at a later date from stars belonging to Scorpio.

The zodiac is eighteen degrees wide, extending nine degrees to either side of the ecliptic, or apparent yearly path of the sun through the heavens. It has this width so as to include within it the moon and planets in all parts of their orbits. It has been divided into twelve parts known as the signs of the zodiac, now pictured as decoration with our sky map. Each of these signs is thirty degrees long, so there is one for each month of the year and three to a season. Originally they lay in approximately the same positions as the corresponding constellations whose names they bore. Due to the "Precession of The Equinoxes", however, the signs of the zodiac no longer agree in position with the constellations for which they were named. The first sign of the zodiac, Aries, is the first of the spring signs—Aries, Taurus and Gemini. It occupies the first thirty degrees along the ecliptic eastward from the vernal equinox, which is also known as "The First Point in Aries". Ninety degrees, one fourth of the distance around the ecliptic, are occupied by these three signs. They are followed in turn by the three summer signs—Cancer, Leo and Virgo. The autumn signs next in order are Libra, Scorpio and Sagittarius, and the winter signs, Capricornus, Aquarius and Pisces.

The signs of the zodiac will always be found in exactly the same positions with respect to the vernal equinox. Aries will always occupy the first thirty degrees along the ecliptic counted eastward from the vernal equinox. The position of this point, however, is not stationary in the heavens. It is the point where the celestial equator crosses the ecliptic; also the point where the sun will

be found at the beginning of spring when it crosses the equator coming north. Each year this point, known as the vernal equinox, advances along the ecliptic in a westward direction a distance equal to about fifty minutes of arc. As the sun's apparent motion during the year is in the opposite direction, or eastward, it appeared as if the vernal equinox "preceded", or advanced, in the direction of the sun as if to meet it on its return, whence the name "The Precession of the Equinoxes". This is used to denote this motion, shared by the autumnal equinox 180 degrees distant along the ecliptic.

As a result of this "Precession of the Equinoxes", which is caused by the gravitational pull of the sun and moon upon the equatorial bulge of the earth, tending to pull it toward the ecliptic, the vernal equinox makes a complete circuit of the ecliptic in about 26,000 years. On this circuit it passes, in turn, through all the constellations of the zodiac in an east to west direction. At the same time, and due to the same cause, the celestial pole describes, in the same 26,000-year period, a circle 23½ degrees in radius around the pole of the ecliptic. Different bright stars lying along the path of this circle become, in turn, Pole-Stars. About 4600 years ago Alpha Draconis was the Pole-Star, and about 12,000 years from now Vega will become the most magnificent of all Pole-Stars, although some distance farther away from the precessional circle than our own Polaris. Another interesting effect of precession is the change in the apparent positions of the constellations in the heavens. About six thousand years ago the Southern Cross was visible in fifty degrees north latitude as a result of precession. It was about two thousand years ago that the sign of Aries lay in the constellation of Aries, but the westward shift of nearly a minute of arc a year along the ecliptic has moved the vernal equinox into the constellation of Pisces, next to Aries on the west. So it is that when the sun is at the vernal equinox on March 21 it is in the sign of Aries but in the constellation of Pisces. When, at the time of the summer solstice, the sun is farthest north it is in the sign of Cancer, but, in position, among the stars of Gemini. Autumn begins with the sun in the sign of Libra, but actually in the constellation of Virgo. At the beginning of winter, when the sun is farthest south in Sagittarius, it is in the sign of Capricornus.

Each sign of the zodiac has its appropriate symbol, supposed in some way to illustrate the object for which it was named. Although of interest to astrologers, the signs of the zodiac are of little use astronomically and are mentioned chiefly in connection with the beginning of the seasons. It is customary, in giving the date of the beginning of a certain season, to state that the sun is now entering the sign appropriate to that season whatever it may be.

The twelve constellations of the zodiac are useful as a guide in tracing the position of the ecliptic through the heavens, and in indicating the region in which we may expect to find the sun, moon, and planets. Like the Big Dipper a zodiacal constellation is an excellent region of reference for the beginner in locating constellations to be seen in the night sky. There are always at least three zodiacal constellations in view at any one time, while in mid-winter we may see Leo, Cancer, Gemini, Taurus, and Aries extending across the heavens from the eastern to the western horizon.

On October 12 there will be a total eclipse of the sun of 92 seconds' maximum duration. The path of total eclipse will be short and will lie entirely in Antarctic regions. Partial phases of the eclipse will be visible in eastern Australia, New Zealand, the south Pacific and the extreme southern part of South America.

On October 27-28 there will be a large partial eclipse of the moon that will barely miss being total. At the time of greatest eclipse ninety-nine hundredths of the moon's diameter will be covered by the earth's shadow.

The beginning of the eclipse will be visible generally in Europe (except the extreme eastern part), the western part of Africa, the Atlantic Ocean, North and South America, and the eastern part of the Pacific Ocean; the ending will be visible in the North Atlantic Ocean, the Arctic Ocean, North and South America, the Pacific Ocean, the eastern part of Australia, and northeastern Asia. The moon will enter the earth's shadow on October 27 at 11:54 P.M., Eastern Time; the greatest eclipse, .99 in magnitude, will occur at 1:36 A.M., October 28, and the moon will leave the earth's shadow at 3:18 A.M.

The planet Venus has come into the evening sky, but sets shortly after the sun and is not well placed for observation this month. It will be in conjunction with Mercury on October 1, but both planets will be too close to the sun to be seen. Mercury also will be too close to the sun for observation until the end of the month. Mars is still a beautiful and conspicuous object in the evening sky in Capricornus, brighter than any star now visible although by now far surpassed in brilliancy by Jupiter, which is in Pisces and visible most of the night. Saturn will be in opposition to the sun on October 21, and visible all night. It lies to the northeast of Jupiter in Pisces. It is now almost exactly equal to Vega in brightness but is yellowish in color. This is now an excellent time to view the planet and its rings telescopically.

•

STAR-EXPOSURE

By OSCAR OSTLUND

When night has closed
Its mighty diaphragm;
Hail to Orion and the Golden Ram,
Auriga's jonquil, and the Pleiad host.

The Living John James Audubon

By PAUL H. OEHSER

AUDUBON'S PAINTING OF THE WILD TURKEY—NOW ONE OF THE VANISHING AMERICANS

THE American interest in Nature, which one present-day literary critic has called "an American trait," is nowhere better demonstrated than in the way in which Americans have taken to their hearts one of their greatest birdmen—John James Audubon. Because he was a very human and energetic personality, as well as an artist, a naturalist, a pioneer, a writer, and a strange combination of success and failure, with enough mystery and glamor in his life to perplex and infect those who came after him, he has been a perennial inspiration to many people.

It is not likely that there is now a man alive who ever saw Audubon in the flesh, although the year of his death, 1851, would barely admit such a possibility. Enough time has elapsed for the name of Audubon to become a legend, and it has. Nearly every school-child in our country knows this name before he knows who Audubon was or what he did, just as he knows Washington's, Lincoln's, and even Lindbergh's. And around Audubon a great body of lore and literature is accumulating, out of which is arising an American hero. The reverberations of his genius, after a hundred years or more, seem to be strengthening rather than diminishing. So it may be profitable to review some recent evidences that Audubon still walks the earth.

The definitive life of Audubon is Prof. Francis H. Herrick's *Audubon the Naturalist,* first published in 1917. Last year Professor Herrick brought out a new, one-volume edition of this biography, incorporating new information that had come to light in the 21 years since the work first appeared. At least four other Audubon biographies have been published in recent years: *Audacious Audubon,* by Edward A. Muschamp, in 1929; *Singing in the Wilderness: A Salute to John James Audubon,* by Donald Culross Peattie, in 1935; *Audubon,* by Constance Rourke, in 1936; and *Audubon, An Intimate Life of the American Woodsman,* by Stanley Clisby Arthur, in 1937.

In addition, Mr. Peattie (with Eleanor R. Dobson) has written an eight-column account of Audubon for the recently completed Dictionary of American Biography, and a chapter called "Wilderness Birdmen," on Alexander Wilson and Audubon, for his popular book *Green Laurels: The Lives and Achievements of the Great Naturalists* (1936).

This cumulative interest in the great woodsman reached a high point on November 16, 1937, when the Macmillan Co., New York, republished Audubon's *The Birds of America* in quarto size, reproducing in color not only the 435 illustrations from the original Elephant Folio edition, but also 65 paintings of western birds that Audubon made at a later date. This book is important, not for any especial distinction in the art of bookmaking or color-printing, but because for the first time it made available at a price within the reach of the general public the complete work on which Audubon's fame as a bird-artist rests. Previous editions of *The Birds of America* have long since passed into the realm of rare collectors' items, to be consulted by the ordinary bird student only in libraries.

It was Audubon's lot to have a dramatic, and to us a romantic life; he lived in an age that has been labeled romantic by literary historians—the age of Byron, Scott, Goethe, and our own James Fenimore Cooper, who died in the same year as Audubon; he met hundreds of prominent persons; he traveled as perhaps no other man of his day traveled—the day of frontier America. There was a great deal of the Paul Bunyan in him. And so it is little wonder that his life has inspired many kinds of writers, writers outside of science and ornithology and art.

Those who attended the 1936 annual dinner of the American Ornithologists' Union in Pittsburgh will remember the "Scenes from the Life of Audubon," written by Samuel Scoville, Jr., of Philadelphia, and effectively presented by the drama department of the Carnegie Institute of Technology. Some of Audubon's interesting relationships with Constantine Rafinesque, Charles Lucian Bonaparte, Sir Walter Scott, and Christopher North were portrayed on the stage, and seemed significant to me in suggesting that a full-length play based on the life of Audubon awaits the pen of some American playwright. The material is certainly there, and with the noticeable increase in the number of (Continued on page 474)

Pine Barrens, Home of the Pyxie

By WARREN C. WILSON

SOUTHEASTERN New Jersey is a remarkable place. In ages past it was covered by the sea; then the dynamic crustal forces of the earth that raise and lower continents pushed the area above sea level. The gently rolling sandy wastes developed a peculiar and characteristic flora that has been, and still is, of much interest to botanists and other plant lovers.

One need not be a scientist to observe the tremendous difference in the manner of growth of familiar plants, and also the host of strange species that inhabit this region, aptly named the Pine Barrens. One generally notices, first, the large number of pines and oaks. They replace the mixed deciduous woods to which most in the East are accustomed. The coffee-colored streams and large sphagnum bogs, with their tangle of plants, also attract attention. In the heart of the Barrens I was surprised to find mature forests hardly higher than my waist. This stunted growth is one of the many unusual features of the region.

A person unacquainted with the Barrens often exclaims over the soil, which is mostly grayish-white sand on the surface with yellowish gravel beneath. The explanation of the stunted growth of plants in parts of the region lies mainly in this soil, according to a common theory devised to explain the existing conditions. The extreme porosity of the ground allows a great amount of leaching by rain water. The quartz sand decomposes so slowly that it does not replenish the minerals that have been washed away. Most plants need these mineral nutrients in ample quantities to produce normal growth. Another, and probably equally important factor, is the high acidity of the soil. This, too, is a result of the leaching; the lime, which keeps a soil neutral or alkaline, has been largely carried away in the drainage water and the soil becomes acid. During the summer the sand dries out easily and the plants must exist on a meager supply of water. Even after a heavy thunder shower one can go about without fear of muddy feet, because the water disappears into the ground almost as fast as it falls. The winters are mild with little snow and the summer temperatures are high.

Since plants, just as persons, show a marked reaction to their environment, it is not surprising that many species cannot tolerate the combination of conditions set up in the greater part of the Pine Barrens area. The climate alone is the controlling influence where boggy conditions prevail. These various factors cause an automatic selection of the kinds of plants that grow in the Barrens. Some of our common plants have not adapted themselves to these unusual circumstances and do not occur there; others grow in the Barrens but are changed in appearance. A third group, which comprises the typical Barrens plants, apparently needs these conditions, for they are restricted

PYXIE OF THE PINE BARRENS

This interesting wild flower has found survival in a soil that is primarily quartz sand

to this and similar regions. In the struggle for existence they have won out and forced the plants not so well suited to this particular environment to more congenial habitats.

The pyxie, also called flowering moss and pine barrens beauty, and, by the botanists, *Pyxidanthera barbulata,* is one of the plants that belongs in this third group, being abundant in the Barrens and other places of the same type but not found elsewhere. The pyxie belongs to the family Diapensiaceae, and was named by Michaux early in the nineteenth century. Its range extends from New Jersey to North Carolina. This plant forms mats about half an inch high—commonly a foot or two in diameter—and has centrally-located roots. The tiny leaves are usually a shiny bright green; in very dry, sunny places they often turn reddish. In the fall many of the plants take on a deep, bronzy-red hue. The profuse white, or sometimes pink, flowers are borne close to the mats. They open in late March, if the season is early, or in April.

Gardeners often dig plants of the pyxie in the Pine Barrens and attempt to move them to their gardens. They rarely succeed in transplanting them; usually the greater part of the roots are left behind and the plants are set out in uncongenial surroundings. I have found that a very small plant, if dug carefully and kept moist, will sometimes grow and bloom when placed in a sandy soil and light shade in the garden. However, nursery plants are less likely to die and are more vigorous.

THE SCHOOL PAGE ★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

Rock and Mineral Keys

The special educational insert in this issue of Nature Magazine deals with rocks and minerals. These may be studied individually or comparatively, but they lend themselves easily to the use of keys, and this page is therefore devoted to a key to some of the rocks and minerals considered in the insert.

Rocks, of course, are solid parts of the earth's crust composed of one or more *minerals.* In winter, ice firmly in contact with the earth is a rock composed of the mineral, water.

To identify some of the commoner rocks or minerals decide first whether you are dealing with a rock or mineral; then consult the appropriate key. Read what is given under the first unit and decide which of the two tests most nearly fits the specimen in hand. Then move on to the next number in the key. Continue this process until the name of a rock or mineral is given.

In most cases the rocks or minerals mentioned in the key are also considered in the charts in the insert in the center of this issue of the magazine. Consult these to learn further of the sample being studied. Then, if everything seems to agree, you may be reasonably sure that you have identified the rock or mineral in hand. One cannot always be certain with rocks and minerals because the rocks, at least, have many intermediate forms. Nor can one be dogmatic in the charts dealing with other forms of Nature.

Hilliard Firschein of Brooklyn, for example, using an earlier chart, decided that a pet turtle was a male because the chart said that the male had red eyes. The turtle laid eggs, so something plainly was wrong. The character of red eyes for the male turtle is a secondary sexual character and generally holds in sex determination. Male humans often have effeminate voices, and female humans sometimes have coarse hair on their faces, and yet one would ordinarily say that male humans have deep-toned voices and female humans have smooth faces. The material in these charts and in these keys must of necessity use the characters that are most distinctive, but don't expect them to fit exactly every situation. Nature is too complex for all of its secrets to be exposed in articles such as these.

A Key to a Few Common Rocks

1. Will effervesce (bubble) if drops of hot or cold hydrochloric acid are placed on it. Read 2.

Will not effervesce when drops of hot or cold hydrochloric acid are placed on it. Read 7.

2. Crystalline. *Marble.*

Not crystalline. Feels smooth. Read 3.

3. Will effervesce only if hot hydrochloric acid is placed on it. *Dolomitic Limestone.*

Will effervesce with cold hydrochloric acid. Read 4. *Limestone.*

4. Composed of rather loosely consolidated shells and shell fragments. *Coquina* (coarse shells). *Chalk* (fine shells).

Not obviously composed of shells, but made of lime and sand or clay. Read 5.

5. Of lime and possibly 15 percent sand, with some clay. *Hydraulic Limestone.*

Fine-grained, without obvious sand mixture. Read 6.

6. Especially fine-grained and compact; resonant when struck. *Lithographic Limestone.*

Not necessarily compact but obviously deposited by precipitation. White or colored. *Travertine.* If banded and dense. *Onyx.*

7. Has the odor of clay when moist or breathed upon; smells earthy. Read 8.

Does not have the odor of clay when moist or breathed upon. Read 12.

8. Breaks into chips or flakes; composed of fine particles. *Shale.* Read 9.

Like above but breaks into thin, brittle sheets or plates and shows a white mark when scratched. *Slate* (metamorphosed shale).

9. Obviously with impurity of sand. *Arenaceous Shale.*

Without obvious sand impurity. Read 10.

10. Usually black because of organic matter. *Bituminous Shale.*

Not black ordinarily. Read 11.

11. With some lime impurity. *Calcareous Shale.*

With some iron impurity. *Ferruginous Shale.*

Mostly clay. *Argillaceous Shale.*

12. Rock mass splits into leaves or fine crumbling particles and a mixture of minerals visible to the naked eye. Read 13.

Rock mass does not split as suggested above. Read 14.

13. Banded, crystalline, with feldspar visible to the naked eye. Inclined to split better in one direction than in others. *Gneiss.*

Material arranged in layers with feldspar not visible to the naked eye. Coarser schists grade into gneisses. Finer schists grade into slates. *Schist.*

14. Individual grains can be determined with naked eye or with hand lens. Read 15.

Individual grains too small to be recognized as such by hand lens. Read 20.

15. Individual grains uniform in size and composition. Read 16.

Individual grains not uniform in size or composition. Read 17.

16. Soft enough to crumble with the fingernail; feels rough and gritty; composed of cemented coarse or fine sand. When broken does not break in flakes across the sand grains. *Sandstone.*

Harder than above; glassy; sand cemented with quartz; may show flaky edges across sand particles when broken. *Quartzite.*

17. Made up of crystals of different minerals such as mica, quartz, feldspar, hornblende, the size of the individual crystals being small. Read 18.

Composed obviously of fragments of other rocks cemented with finer material. Read 20.

18. Quartz present. *Granite.*

Quartz absent. Read 19.

19. Light colored. *Syenite.*

Dark colored. *Diorite.*

20. Fragments rounded as though waterworn. *Conglomerate.*

Fragments angular. *Breccia.*

21. Rock with small and numerous pores usually light in weight and color. *Pumice.*

Rock without small pores. Black or dark in color. Read 22.

22. Glassy. *Obsidian.*

Not glassy. *Basalt.*

A Key to Some Common Minerals

1. May be scratched with the fingernail. (Softer than 2¼.) Read 2.

Cannot be scratched with the fingernail. (Harder than 2¼.) Read 9.

2. Color black or very dark. Read 3.

Not black. Read 4.

3. Splits into elastic sheets; does not make mark on paper. *Biotite.*

Does not split into elastic sheets; very soft; soils fingers; marks paper with black. *Graphite.*

4. Splits into thin, flat, transparent or translucent sheets. *Muscovite.*

Does not split into thin flat sheets or scales. Read 5.

5. Clay-like mass; generally white though may be discolored; has odor of clay when breathed on; sticks to dry tongue. *Kaolin.*

Not clay-like. Read 6.

6. Large crystals or granular crystalline. May be dissolved in water; has salty taste. *Halite* (salt).

Not of large crystals. Read 7.

7. Color greenish to white. Read 8.

Color not greenish; may be transparent. *Gypsum, Selenite.*

8. Has a greasy feel; will mark on cloth. *Talc.*

Lacks a greasy feel; mica-like, but plates not elastic. *Chlorite.*

9. May be scratched with a cent. (Softer than 3.) Read 10.

Cannot be scratched with a cent. (Harder than 3.) Read 14.

10. Color white or colorless; may be tinted red, blue, green or other colors; effervesces in cold hydrochloric acid. *Calcite.*

Color not white, nor colorless; does not effervesce with cold hydrochloric acid. Read 11.

11. Color lead-gray. Crystals, cubic. *Galena.* Lead ore.

Color not lead-gray. Read 12.

12. Color copper red; an irregular mass, scales or twisted wire-like materials. *Copper.*

Color not copper red. Read 13.

13. Has greasy feel; color greenish. *Serpentine.*

Does not have a greasy feel; effervesces in hot hydrochloric acid. *Dolomite.*

14. May be scratched with a knife. (Softer than 5.5) Read 15.

May not be scratched with knife except with great difficulty. Read 19.

15. Crystalline. Read 16.

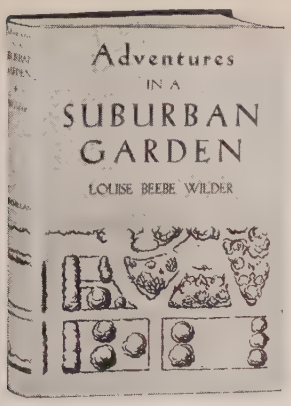
Not crystalline. Color dark brown to nearly black; sometimes of a metallic luster; shows a yellow streak on porcelain. *Limonite.*

16. Of a metallic luster. Read 17.

Not of a metallic luster; colorless, white or tinged with blue, yellow or other colors. Read 18.

(Continued on page 476)

Your Garden Bookshelf



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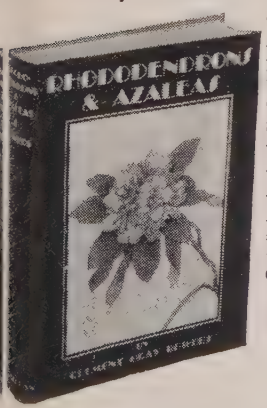

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TIPS ON TULIPS

(Continued from page 439)

and the stamina of Darwins are responsible for a race that bears flowers almost as large as the May-flowering type, blooming two to three weeks earlier than that. Thus Triumphs bridge the gap between the early- and late-blooming types, giving the gardener uninterrupted continuity for his color carnival.

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Aviateur is of shimmering carmine-red, with a white edge; Denbola offers a dark amaranth-red piped with a creamy white. But the straight salmon-rose of Johanna, and reddish-violet of Telescopium are just as impressive. There really is a Triumph tulip for every taste and fancy.

The time to plant them is from early October until frozen soil puts an end to gardening. I have planted them four inches deep, five to six inches apart, as late as the day before Christmas, and they bloomed in May—just as they did at the World's Fair.

INDOORS AND OUT

(Continued from page 423)

island of Skokolm in October, 1927, brought his bride there the following July, and lived on the island long enough to demonstrate the possibilities of such a life. His book describes this life and his many excursions to other islands. With all its interest that I call "romantic" for want of a better word, this is a solid book, describing each island and its human and wild inhabitants, illustrating them with fifteen excellent black and white maps and documenting the observations with forty-nine examples of the author's understanding of the art and usefulness of photographs.

Lockley's ornithological work has now been so highly recognized that the "procession of visitors has had to be organized," and "as a result Skokolm has now the tag 'Bird Observatory' attached to it." His way of living, however, has been modified: "Ann had now to go to school."

"So it has come to this—that we winter on the coast opposite the island. Like the guillemots, we pay it day-visits in midwinter; like the puffins, we return to live on it at the end of March; and, like the storm-petrels, we temporarily abandon it in October."

John Burroughs

The John Burroughs Association wishes to get in touch with all organizations anywhere that have been organized to honor the Sage of Slabsides. The purpose is to discover whether there is interest in a yearly publication containing reports of these various groups and articles about John Burroughs. Write to Dr. Clyde Fisher, American Museum of Natural History, 77th Street and Central Park West, New York City.

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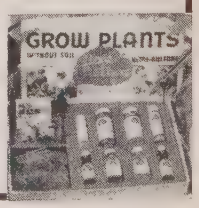

NATURE IN PRINT

As a convenience to readers the books reviewed in this department of Nature Magazine may be ordered through the book department of the American Nature Association.

Great Animal Stories

In three splendid volumes Frances E. Clarke has compiled collections of great stories of dogs, cats and horses, stories that will live and be read and reread. She has now rounded out this collection of books with a compilation of great wild animal stories of our day, and has titled the book *Wild Animals*. Among the authors included are William Beebe, Courtney Ryley Cooper, James Oliver Curwood, Hal G. Evarts, Grey Owl, Edward A. Preble, Archibald Rutledge, Herbert Ravenel Sass, Samuel Scoville, Jr., and, last but by no means least, the late Dallas Lore Sharp. Through this volume runs a strong thread of wildlife conservation. Miss Clarke has chosen stories that reflect a deep understanding of the world of the wild. As with her previous books, she has read widely and chosen carefully to give us a book of outstanding permanent value. We are happy to note that four of the selections first made their bow in the pages of NATURE MAGAZINE. As with its companion volumes, this book is published by Macmillan at $2.50.

Indian Legend

Marion E. Gridley is the wife of Chief Whirling Thunder of the Winnebagos, and for sixteen years has been secretary of the Indian Council Fire, a national organization devoted to Indian interest and Indian welfare. She is, therefore, outstandingly equipped to write *Indian Legends of American Scenes*, and thus to preserve legends of many tribes. The book is divided into chapters devoted to the Indians of many sections of the country, and each group of legends is preceded by a brief picture of the history of the Indians of these sections. Fascinating reading, the book also has notable historical value. It is illustrated by eleven color plates and a number of black and white drawings. Published by M. A. Donohue and Company, it sells for one dollar.

The Book of Turtles

Filling a place not hitherto adequately filled, *Turtles of the United States and Canada* by Clifford H. Pope will be hailed by everyone interested in turtles. This book is, in fact, the only complete treatment of American turtles. It is popular and interesting in text, and will serve the layman as well as the more advanced student for identification and as a source of information on character, life habits and distribution. The text, which begins with a general discussion of turtles, is supplemented by ninety-nine fine photographs that splendidly aid in identification. Dr. Pope was for ten years the assistant Curator of Herpetology at the American Museum of Natural History, and is the author of a standard study of the reptiles of China, having spent five years as field naturalist in China with Dr. Roy Chapman Andrews. The book is published by Alfred A. Knopf and the price is $3.75.

Plants Without Soil

Visitors to the New York World's Fair have seen in the Heinz Building and the Westinghouse Building interesting demonstrations of hydroponics, or the growth of plants without soil. Elsewhere in this greatest of world's fairs they have seen suggestions of the world of tomorrow in which such methods of production are to play a part. This reflects the growing interest in this subject, about which a popular literature is gradually being built up. A recent addition to books on this subject is *Growing Plants without Soil* by D. R. Matlin. This text is subtitled "The A.B.C. of Plant Chemiculture" and is valuable to anyone experimenting in this field. The book is published by the Chemical Publishing Company, 148 Lafayette Street, New York City, at two dollars.

A Unique Garden

Charles F. Barber of Oregon has a unique garden with many notable specimen plants. He is interested in the development of new plants and in growing existing forms to their fullest possibilities. But, beyond that, Mr. Barber feels that his success with plants derives from an understanding of them that is almost spiritual; that he enters his garden through a "secret gate" that opens up to him opportunities not vouchsafed most of us. His views and his garden are described in *Our Garden,* an interesting although sometimes elusive little book. The publishers are Binfords and Mort, 102 N. W. Ninth Avenue, Portland, Oregon, and the price is $1.50.

About Small Animals

Written entertainingly and with a background of a thorough knowledge of the subject, Robert Snedigar's *Our Small Native Animals, Their Habits and Care* is a worth-while book. We trust that it will not inspire too many youthful collections and backyard zoos, since our wildlife resources in many sections, so far as some species are concerned, can ill afford further inroads. The chief value of the book, to us, lies in the discussion of life habits, and in the proper care of wild pets when those pets may justifiably be kept in captivity. It should have one salutary effect in informing young zoo curators how to keep their charges in a state of relative comfort and health. Published by Random House, this book sells for $2.50.

Animals in Winter

The latest addition to the fine collection of field books published by Putnam is entitled *Field Book of Animals in Winter* and is the work of Ann H. Morgan. Following the general style of its companion volumes, and like them in size, this book is devoted to insect, reptile, bird, mammal and other forms and their winter activity or lack of activity. The author is professor of zoology at Mount Holyoke College. This is an invaluable book for Nature students and graphically shows what may be observed and learned during the northern winter months. The price is $3.50.

Mathematics

The mathematically-minded Nature enthusiast will find provocative ideas in a little book entitled *Fabre and Mathematics,* a collection of essays by Lao Genevra Simons, published by Scripta Mathematica, Yeshiva College, Amsterdam Avenue and 186th Street, New York City. The price is one dollar.

FOR BIRD LOVERS

The Library Committee of the Audubon Society of the District of Columbia has compiled a splendid list of recently published bird books and has kindly extended to us permission to pass this list on. Copies of these books may be purchased through your local dealer, from the publishers, or through the Book Department of the American Nature Association. The complete list is:

Batchelder, Charles Foster. AN ACCOUNT OF THE NUTTALL ORNITHOLOGICAL CLUB. Memoirs Nuttall Ornith. Club No. 8, 109 pp., illus., 1936.

Beebe, William. THE LOG OF THE SUN: A CHRONICLE OF NATURE'S YEAR. 8 vo., cloth, 321 pp., N. Y. Holt, 1938, $2.50.

Bennett, Logan J. THE BLUE-WINGED TEAL. 8 vo., cloth, 160 pp., illus., Ames, Iowa. Collegiate Press, Iowa State College, 1938, $1.50.

Bent, Arthur Cleveland. LIFE HISTORIES OF NORTH AMERICAN BIRDS OF PREY. (Part 2). 8 vo., paper, 482 pp., illus., U. S. Nat. Mus. Bull. No. 170, Washington, D. C. Smithsonian Institution, 1938, 60 cents.

Burroughs, John. SONGS OF NATURE. 12 mo., cloth, 359 pp., N. Y. Garden City Pub. Co., 1938, $1.19.

Canby, Henry Seidel, ed. THE WORKS OF HENRY DAVID THOREAU. 8 vo., cloth, 848 pp., 11 reproductions of photographs by Henry B. Kane. Boston, Houghton Mifflin, 1937, $5.00.

Chapman, Frank M. LIFE IN AN AIR CASTLE. 8 vo., cloth, 250 pp., illus., N. Y., Appleton-Century, 1938, $3.00.

Commons, Marie Andrews. THE LOG OF TANAGER HILL. 12 mo., cloth, 261 pp., illus., map in pocket. Baltimore, Md., William and Wilkins, 1938, $2.50.

Darling, F. Fraser. BIRD FLOCKS AND THE BREEDING CYCLE. 12 mo., cloth, 124 pp., N. Y. Macmillan, 1938, $1.75.

Halle, Louis J. BIRDS AGAINST MEN. 12 mo., cloth, 228 pp., N. Y., Viking Press, 1938, $2.50.

Herrick, Francis Hobart. AUDUBON THE NATURALIST. 2nd ed., two vols. in one. 8 vo., cloth, 951 pp., illus., N. Y., Appleton-Century. 1938, $6.00.

Hoffman, Ralph. BIRDS OF THE PACIFIC STATES. 12 mo., cloth, 353 pp., illus., 10 col. plates. Boston, Houghton Mifflin. 1938, $3.50. (Reprint 1927 ed.)

(Continued on page 474)

THE ASSOCIATION'S BOOK SHELF

From the many hundred bird books published it is difficult to select a bird lovers' library. The following bird books, however, are recommended by the American Nature Association and will serve as an excellent foundation for such a library. Order direct from your Association.

BIRDS OF AMERICA.....$3.95

By T. Gilbert Pearson, John Burroughs, Edward H. Forbush and others

The most comprehensive, most beautifully illustrated encyclopedia of American Bird Life ever published. Now complete in one mammoth volume, size 8¼ x 11¼ x 1¾ inches. Beautifully bound in genuine green Fabricoid stamped with gold title and decorations on backstrap, doubly reinforced for long hard usage. Contains more than 1,000 pictures, more than 1,000 birds, more than 1,000 pages. A fascinating treasure house of knowledge for nature lovers of all ages everywhere.

A GATHERING OF BIRDS.....$3.00

By Donald Culross Peattie

A book every bird lover has been waiting for—the best that has been written about birds by the great ornithologists of the last 150 years, included in a single volume. 379 pages.

BIRD COMPANIONS.....$3.00

By Angelia Kumlein Main

One of the most original and interesting of all recent contributions to popular bird lore. It is very evident that the author has not only been a lover of birds from early childhood but was literally brought up in intimate companionship with them and therefore has enjoyed unusual opportunities for learning of their ways. 40 illustrations, many in colors. Blue cloth stamped in gold, jacket in colors.

HUMAN SIDE OF BIRDS.....$1.49

By Royal Dixon

A sympathetic colorful book of true stories and personal experiences which will give you a new understanding and interest in the lives and habits of our feathered friends. Not a guide or scientific tome, but a simple factual explanation of the qualities and activities which birds have in common with human beings.

REAL BOYS AND GIRLS GO BIRDING.....$2.00

By Jack Van Coevering

Here is a story of adventures afield by and with young people. It is based upon many experiences with boys and girls that go birding and is delightfully written with action and personalities. An ideal gift for any youngster. 98 fine pictures supplement the text.

FIELD BOOK OF WILD BIRDS AND THEIR MUSIC.....$3.50

By F. Schuyler Mathews

This popular and useful book for identifying birds by their songs, by their color and by other methods, includes species common east of the Rocky Mountains. 376 pages with 52 colored plates, numerous illustrations in black and white and complete musical notations of bird songs by the author.

BIRD AND ANIMAL PAINTING BOOK.....$1.50

By R. Bruce Horsfall

Beautifully printed, size 8½ x 11 inches, contains 168 pictures of birds, animals and insects, in full colors, size 2½ x 3½ inches and an attractive frontispiece of the American Eagle. Each picture accompanied by concise description of the character and habits of the subject. Good for school, camp or home.

LAND BIRDS, East of the Rockies.....$1.50

By Chester A. Reed

Pictures in natural color of 216 birds. Shows both male and female birds. For each is given the common name, scientific name, size, distinguishing characters for quick identification, time of year usually seen, the bird's note or call, description of nest and eggs, and the usual range, breeding place and wintering place. Names are arranged in one alphabetical index. Includes suggestions for protecting birds and attracting them to our homes. 228 pages, size 5½ x 3¼.

NATURE ON PARADE.....$5.00

An album of more than a thousand of the finest Nature photographs ever taken, with descriptive story relating to them. They unfold the camera's record of the life history of birds, mammals, or insects; or they represent typical flowers, trees and other Nature forms of a certain region. A book of surpassing beauty and constant interest. It is a limited and numbered edition of one thousand volumes. Book size 9 x 12, 388 pages in genuine green Fabricoid, Spanish grain, soft padded cover, stamped in gold leaf.

THE BOOK OF BIRDS FOR YOUNG PEOPLE $3.00

By F. Schuyler Mathews

A good guide which gives migration routes, well illustrated with colored plates. 323 pages with 66 colored plates and 29 illustrations in black and white.

BIRDS OF THE OCEAN.....$3.50

By W. B. Alexander, M. A.

A handbook for voyagers. 461 pages with 140 illustrations. A convenient handbook for the identification of the various species of seabirds likely to be met with on ocean voyages in any part of the world.

BIRDS OF THE PACIFIC COAST.....$3.50

By Willard Ayres Eliot

Illustrated in unusual color plates which show the males in full breeding plumage. Females differing radically in color are also shown. Attention is called to striking patches of color that serve as distinct field marks. 228 pages with 56 colored plates by R. Bruce Horsfall.

WESTERN BIRD GUIDE..... **Imitation Leather** $1.75

By Chester A. Reed and others

Each page contains a color picture of one or more birds, 480 in all. The text gives common and scientific name, size in inches, distinguishing characters in summer and winter, description of nest and eggs, and where seen at various seasons. Describes the typically western birds and those likely to be seen from the Rockies to the Pacific. Alphabetically indexed. 252 pages, 5½ x 3¼ in size.

THE BIRD KINGDOM.....$1.00

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FOR BIRD LOVERS

(Continued from page 472)

Kantor, MacKinlay. THE NOISE OF THEIR WINGS. (Fiction) 12 mo., cloth, 240 pp., N. Y., Coward-McCann. 1938, $2.50.

Kirkman, F. B. BIRD BEHAVIOUR. 8 vo., cloth, 232 pp., illus., N. Y. and London, Nelson, 1938, 7 shillings 6 pence.

Oberholser, Harry C. BIRD LIFE OF LOUISIANA. 8 vo., paper, 834 pp., illus. col. pl., New Orleans, La., Dept. of Conservation, 1938, $1.00.

Priestley, Mary. A BOOK OF BIRDS. 12 mo., cloth, 384 pp., 82 wood engravings by C. F. Tunnicliffe, N. Y., Macmillan, 1938, $2.50.

Ritter, William Emerson. THE CALIFORNIA WOODPECKER AND I: A STUDY IN COMPARATIVE ZOOLOGY. 8 vo., cloth, 340 pp., col. illus., Berkeley, Calif., Univ. of Calif. Press, 1938, $3.50.

Roberts, Thomas S. LOGBOOK OF MINNESOTA BIRD LIFE, 1917-1937. 8 vo., cloth, 355 pp., 21 line drawings and frontispiece etching by Walter J. Breckenridge, Minneapolis, Minn., Univ. of Minn. Press Ltd., 1938, $3.50. Ed. limited to 500 copies, only 400 for sale.

Robertson, A. W. P. and Powell, R. D. BIRD WATCHING DAYS. 8 vo., cloth, 252 pp., 32 photos by author, N. Y., Collins, 1938, $2.50.

Ross, William Graham. BIRD NOTES FROM THE JOURNAL OF A NATURE LOVER. Ed. by Ella L. Clark. 12 mo., cloth, 169 pp., map, Chicago, Ill., W. B. Conkey Co., 1938.

Sprunt, Alexander. BEAUTIFUL BIRDS OF SOUTHERN AUDUBON SANCTUARIES. Illus., N. Y., Nat. Asso., Audubon Soc., 1938, $1.00.

Stephens, T. C. SUMMER BIRDS OF LAKE OKOBOJI REGION OF IOWA. 8 vo., paper, 63 pp., Univ. of Iowa Studies, n. s. 348, Studies in Nat. Hist., v. 17, no. 7, Iowa City, Iowa, St. Univ. of Iowa, 1938, 35 cents.

Stevenson, James O., et al. CHECK-LIST OF THE BIRDS OF THE U. S. NATIONAL PARKS. 4 to., 400 pp., mimeographed. Washington, D. C., U. S. National Park Service, 1938. Free.

Taverner, Percy Algernon. BIRDS OF CANADA. 8 vo., cloth, 445 pp., 661 illus., 173 col. pl., Philadelphia, Pa., McKay, 1938, $4.00.

Van Dersal, William. NATIVE WOODY PLANTS OF THE UNITED STATES, THEIR EROSION-CONTROL AND WILD-LIFE VALUE. 8 vo., cloth, 362 pp., 44 illus., maps. U.S.D.A. Misc. Pub. 303. Washington, D. C., Gov. Print. Office, 1938. $1.75. (Bird stomach records and observations on bird feeding habits, pp. 35-292.)

Van Tyne, J. and Sutton, George Miksch. BIRDS OF BREWSTER COUNTY, TEXAS. 8 vo., paper, 119 pp., illus., map. Univ. of Mich. Mus. of Zool. misc. pub. 37, Ann Arbor, Mich., Univ. of Mich. Press, 1938, $1.25.

Verrill, A. Hyatt. STRANGE BIRDS AND THEIR STORIES. 8 vo., cloth, 203 pp., illus., col. pl., Boston. Page, 1938, $2.50.

White, Francis B. LOCAL NOTES ON THE BIRDS AT CONCORD, NEW HAMPSHIRE. 8 vo., 126 pp., map. Concord, N. H., Rumford Press.

Wolfe, Linnie Marsh. JOHN OF THE MOUNTAINS: UNPUBLISHED JOURNALS, 1869-1911, OF JOHN MUIR. 8 vo., cloth, 459 pp., 9 illus. from photos, Boston, Mass., Houghton Mifflin, 1938, $4.50.

THE LIVING JOHN JAMES AUDUBON

(Continued from page 468)

biographical and historical plays at the present time I venture to predict that it will not be many years until Audubon has his play.

Even poets have not escaped the Audubon magnetism. Rosemary and Stephen Benét, for example, have included, in their *A Book of Americans,* a charming poem for children, beginning

> "Some men live for warlike deeds,
> Some for women's words.
> John James Audubon
> Lived to look at birds"

and going on to tell his whole life story in nine vivid and sprightly stanzas. In September, 1936, in *The American Mercury,* Amanda Benjamin Hall published a poem entitled "Salute to Audubon"; and in the Spring, 1937, number of *The North American Review* the poet Thomas Caldecot Chubb had an article on Audubon titled "The Birds of North America." Another poetic tribute appeared in the February, 1937, issue of *Poetry: A Magazine of Verse;* it is an imaginative sequence by the New England poet John Peale Bishop called "Homage to Audubon," in four parts: "Conquest of the Wind," "Fourteen," "The Silence of the Sideboard," and "Les Balcons Qui Rêvent." Mr. Bishop is a writer of national reputation, and his selection of the Audubon theme is significant as another step in the assimilation of the Audubon legend into our national literary tradition.

In the field of the essay, you may find a delightful piece on Audubon by my friend Howard Zahniser in his "Indoors and Out" page in the April, 1939, issue of NATURE MAGAZINE.

I have by no means mentioned all the Audubon items that have recently appeared. Someone, of course, will come along in a few years and "debunk" Audubon, a thing that will probably need doing more or less periodically in order to keep fact and fiction from being hopelessly commingled. In a measure this has already been done by Professor Herrick in the new edition of his *Audubon the Naturalist,* and by Mr. Arthur in his biography, both of whom deal, with discredit, with the theory seriously offered by some that Audubon was none other than the famous Lost Dauphin of France, the son of Louis XVI.

As a writer, Audubon's reputation is not great. He will not go down in history as a master of English, although his journals and letters, particularly those to his intimate friends, are written with great gusto and frankness, although deficient in some respects. We must remember, however, that Audubon lived at a time when American writing was at a low ebb, and that his writing was probably above average. Audubon's contribution to American literature will be a passive one, arising from the fact that his life story is a reservoir of inspiration for others that will be pervasive and lasting. In his art, and in his science, too, there is that same kind of infectious impetus; they are not perfect, but they have been and will continue to be immeasurably great in their influence.

Not long ago there was opened to the public a new Audubon memorial—the Audubon Museum in Audubon Memorial Park in Henderson, Kentucky, the town where the young artist once lived and worked. The building's first floor has a gallery for Audubon prints, a Kentucky room containing pioneer material, and a room for the use of the society known as the Transylvanians. On the second floor is space for exhibits of mounted birds, books, and Audubon memorabilia. The structure is of native stone, much of it quarried in the park; it is of Norman design and includes a round bird tower with pigeon holes in the masonry. The memorial is a joint project, sponsored by the Audubon Society of Henderson, the State of Kentucky, the City of Henderson, the Transylvanians, and the Henderson Historical Society. It is probably the newest and one of the most impressive tributes to the memory of John James Audubon; it is in the same class with the far-flung Audubon societies, the Audubon Nature camps, Audubon Park in New York City, the Audubon statue in the Hall of Fame, and other memorials that have taken a concrete form. But all these in the end will be but roadside markers of the real tribute of America to Audubon—the transcendence, less than a hundred years after his death, of his name and nature in our culture and inheritance.

Generous Waxwings

"We were driving slowly through a cemetery," writes Elizabeth D. Morgan of Toledo, Ohio, "when we noticed ahead of us a flock of cedar waxwings flying from a tamarack tree to the ground and up again. Just below the tree one of the water faucets was dripping into a cluster of old oak leaves. The hollowed leaves held the water like a cup. From this the birds were drinking in turn. There must have been twelve or fifteen birds in line, and as each took a sip, he either flew up into the tree above, or slipped quietly to the end of the line and waited his turn again. It was this lining up for a second or third drink that seems to me to prove that the waxwing is naturally generous. There was no crowding, almost no sound, but a quiet, happy sharing of the water that was delightful to see. The whole scene had an air of unreality. The birds were so silky, so quiet, so undisturbed by their audience, and yet so cheerful in their manner and so confiding as they sat in the branches or took their little drinks, that we have never forgotten the picture, and often speak of it. The group on the ground was only a part of the flock. The larger group in the tree seemed perfectly contented to wait until their companions had satisfied their thirst, and then the whole company took wing together."

Trade Reptiles?

Loren Stern of 4450 North Kimball Avenue, Chicago, Illinois, is an amateur herpetologist and would like to correspond and exchange specimens with others having a similar interest. G. A. Bishop, Route 2, Holt, Mo., also would like to be included.

Diana Thorne's

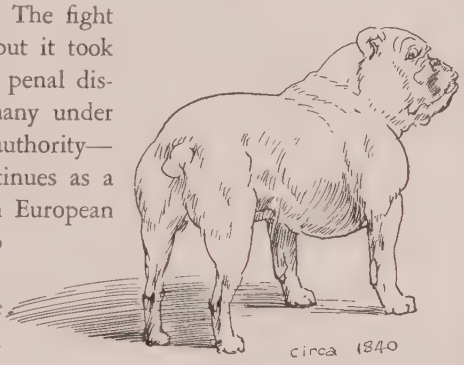
DOG COLUMN

THE BULLDOG

Then and Now

BULL and bear baiting, practiced in England, as in the rest of Europe, since the Dark Ages carried part of the miseries of that darkness into the last century and up till the middle of it. Then the light dawned on the British people, and the bulldog, as well as the wretched bull, were released from their activities for such popular diversion.

At about the same period the S.P.C.A. had its inception in a very small group of people keenly sensitive to the prevailing indifference toward cruelty to animals. The fight for decency in that respect began; but it took fifty years of heroic effort backed by penal discipline before shocking cruelties—many under the aquiescence of governmental authority—ceased. Even today fox-hunting continues as a social privilege; and in the southern European countries the S.P.C.A. still battles to gain a foothold.



The bulldog today has shed the black mantle of his earlier repute and emerges, not as a baiter and fighter, but as one of the most gentle and lovable of characters.

In my childhood the opening line of a hymn from the pen of the redoubtable Dr. Watts, respected by our grandparents, ran—"Dogs delight to bark and bite". As a child, suspecting but not daring (without further experience) to question the wisdom of my elders, I wondered whether Dr. Watts should be taken seriously. The years as they passed proved the inherent rightness of my scepticism. Dogs—all dogs—desire, as much as the more sane among humans a peaceful and a gentle life. I often doubt whether the most feral of the carnivorous mammalia would not prefer to obtain their sustenance by other means than by hunting and killing. Certainly, in all but a few exceptional cases, the urge to hunt and kill is not founded on a desire to hurt but on the vital necessity for self-preservation. One cannot say as much for man.

The bulldog is a symbol. He is as much emblematic of Britain as is the rose or the lion. Like many a human, he had much to live down in his family history. He has now come into his own with a halo of gentleness, staunchness and sweetness of disposition, characteristics obscured in the past. These qualities make him, considering his other admirable qualities, an ideal pet for man, for woman, for a household of children, or as the guardian of a baby. No kidnapper would have a moment's chance with a bulldog around unless the dog were killed first.

A couple of centuries ago it is probable that in form he was more like the bull-terrier, so far as can be discovered by reference to the written descriptions.

(Continued on page 476)

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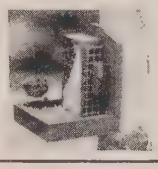

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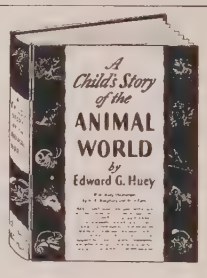

Dorothy Canfield says: "If you have an intelligent boy or girl from 11 to 14 in the house, or can beg or borrow one occasionally, it will pay you to procure and read aloud this guide to the understanding of the animal world."

Donald Culross Peattie says: "I am convinced that any child would read this book for the fun of it, and emerge, without mental effort, grounded in the fundamentals of zoology."

Dr. Raymond L. Ditmars writes: "This is a fine book, well written and arranged and I think it should enjoy a big following of both children and adults."

"No book for the younger readers which I have run across this year seems to me superior in real interest and value . . . and I mean children from 6 to 60."

—**Ted Robinson, *Cleveland Plain Dealer.***

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THE BULLDOG

(Continued from page 475)

It is only within the last hundred years that the graphic depiction of animals developed to a point of anatomical accuracy. A reference to the paintings of racehorses a hundred years ago and a comparison of these with what is done by present-day painters, like Munnings, will illustrate the point.

In courage the bull dog has no superior. Stonehenge and all other writers on the dogs and on sport of bygone days generally describe him as "the most courageous animal in all creation". That is, quite possibly, not a colorful exaggeration.

The Springer Spaniel

Treating with the breed from every point of view, *The Springer Spaniel* by Maxwell Riddle is a fine addition to the dog lover's library. The author is a breeder, judge and journalist with a thorough knowledge of this dog, the care and training of which are items of importance to every owner. The book is published by the Judy Publishing Company, Chicago, at two dollars.

About the Boxer

This is not a book on fisticuffs but about one of the most interesting of dog breeds, the Boxer. It is, in fact, the first thorough discussion of this breed and represents long research. This dog is not widely known or appreciated in the United States, due to the dearth of knowledge about it. John P. Wagner has remedied this in *The Boxer,* and the publication of the book by the Orange Judd Publishing Company should serve to direct attention of American dog lovers to this rather generally neglected breed. The price is $3.50.

Bees and Hurricanes

With the great loss of lives and property through such a tragic hurricane as that in New England last fall, the tendency is to ignore many of the minor effects. We got to wondering how bees survived such an experience and so wrote to Allen Latham, Connecticut bee-keeper who had the misfortune to live in the path of the gale. Although his crop was ruined and the bees much upset, he tells us that he lost very few bees.

"In the early stages of the storm," Mr. Latham writes, "the bees refrained from leaving their hives and thus, unless the hives themselves were disrupted by the wind, little harm resulted.

"Out of some 380 hives I lost three by drowning, and had one hundred or so overturned by the high wind. These hives were of such a construction that they did not fall apart when overturned, and also they had fixed-frames.

"Hives of the common factory type, with loose bottoms, loose bodies and loose covers naturally fell apart when overturned. If in an unsheltered spot, these hives rolled about and spilled their insides, leaving the bees exposed to the rain and the full blast of the wind. In such cases the loss was rather bad.

"Bees, however, instinctively cling tenaciously when exposed to wind, and in many cases the beekeeper was able to reassemble the parts of the hives and save many of the bees still clinging to the combs. Occasionally a queen was lost, and in all cases more or less brood was destroyed, so of course, there was a marked loss in the population of the disrupted colonies.

"In many instances big trees fell upon hives and damaged them slightly, but the loss from this cause was low. It meant some trying labor to remove those trees and get the hives back into position and condition.

"In the southeastern part of Connecticut the worst loss to the bees was the blasting of the fall bloom by the salt spray, driven fifty miles inland. The storm occurred in the height of the goldenrod bloom, and beekeepers were counting on this bloom to furnish the bees honey for their winter use. No honey of any account was gathered after the storm, 99 percent of the bloom having been destroyed."

Book List

The Palisade Press, 280 Broadway, New York City, has issued a new folder listing and describing the bird and Nature books it has published.

Another Herpetologist

Allyn L. Wood, 2502 North Alabama Street, Indianapolis, Indiana, is the latest addition to the list of young men interested in herpetology and desirous of corresponding and exchanging with others having a similar interest.

THE SCHOOL PAGE

(Continued from page 470)

17. Brass-yellow in color. *Chalcopyrite.*

Reddish brown to black making cherry-red streak on porcelain. *Hematite.*

18. Crystals in cubes. *Fluorite.*

Crystals not in cubes; very heavy. *Barite.*

19. May be scratched with glass. (Softer than 6.) Read 20.

Cannot be scratched with glass. Read 21.

20. Crystalline. Black or greenish. *Hornblende,* an *Amphibole.*

Not crystalline; colorless, white or showing a play of color. *Opal.*

21. With a metallic luster. Read 22.

Without a metallic luster. Read 23.

22. Black; heavy; magnetic. *Magnetite.*

Not black; pale brass color. *Pyrites* (fool's gold).

23. Breaks to show definite plane surfaces. *Feldspar.* Read 24.

Does not break to show definite plane surfaces. Read 25.

24. Cleavage surface with cross lines (striations). *Plagioclase Feldspar.*

Cleavage surface without cross lines. *Orthoclase Feldspar.*

25. Glassy; shows rounded or conchoidal fractures; variously colored.

Quartz. If colorless, *Quartz Rock Crystal.* If purple, *Amethyst.* If rose or pink, *Rose Quartz.* If brownish or black, *Smoky Quartz.* If in variegated bands, *Agate.* If opaque red, *Jasper.* If dull and dark, *Flint.*

Without conchoidal fracture. Read 26.

26. Soluble in hydrochloric acid; olive to gray green. *Olivine.*

Not soluble in hydrochloric acid; red, brown, yellow, green or black. *(Garnet.)*

THE LITTLE BROWN FAMILY

by Mabel E. Pattee

I first met little Mr. Brown on a cold morning in April, after a heavy fall of late spring snow. The ground was covered until not a bare spot remained, and a disconsolate chirp from the festooned currant bushes gave notice of a song sparrow in dire need.

A spot was soon swept bare near the garage, and a tempting array of food was spread out. Anything eatable was accepted at first, but soon Mr. Brown chose a little pile of chicken mash as his favorite, and until long after the snow had melted and other supplies were handy he continued to return, and, with queer scratching hops, seek out the bits of mash in the sprouting grass.

Some weeks later, while cleaning the yard, I thought it looked as if some bird was using a small red cedar tree close to the porch for a night's lodging place. So I watched from the window that evening, and just at dusk came a whisking shadow. Across the porch steps and into the dark shelter of the cedar scuttled little Mr. Brown and settled down for the night.

Every evening he sought safety in the little tree, and one day, parting the branches, I found a tiny, flat platform built of twigs laid across the branches close against the trunk of the tree. Using opera glasses from inside the window, toward night, I could see him resting secure on the neat little floor. And what was my amusement one rainy night to see him settle underneath his platform, letting it serve as an umbrella over his sleek little back.

Then came the night when not one, but two small shadows melted into the branches. Mrs. Brown had arrived!

For a time I ceased to watch them, but one day I caught a glimpse of one trailing along a wisp of dead grass, and supposed they were building on the ground. One fair and warm Sunday morning, to my astonishment, I found in a rose bush climbing on the porch, opposite the cedar tree and about six feet from the ground, a snug and complete little nest and from the inside peeped the bright, beady eyes of Mrs. Brown. The first time I ever knew a song-sparrow to build off the ground!

I tacked a piece of window shade inside on the porch screen to shield her from alarm from people and cats and soon there were five blue-white eggs spotted with brown. Then the little lady began her task of brooding her treasures and we could look over the shade-top without frightening her in the least. Mr. Brown faded out, seemingly, for a while, except that he mounted to the telephone wires at dawn and poured out a lovely, silvery serenade to tell Mrs. Brown that it was another day, and all was well.

Just twelve days after she began her vigil Mrs. Brown slipped off her nest one morning to reveal five wriggling atoms, topped with a bit of fuzz cuddled in the pretty cup. Mr. Brown reappeared like magic, and there were busy days of hunting and worm-carrying to feed the ever-hungry babies.

One day a wild shriek of fear from the parents brought me running to see the old cat clinging to the screen, her head bumping the frail nest. Quiet was restored and a piece of chicken wire fenced off the space from porch post to house corner, and the cat was kept inside the house at night.

One chilly evening I stepped out on the porch and accidentally struck the screen; to my consternation, off flew Mrs. Brown. I retreated hastily and waited anxiously for her

return. Just as darkness fell she managed to flutter into the bush to make her way slowly from twig to twig, nearer and nearer, till she slipped over the brim of the nest to hover the blanketless babies. If her relief was as great as mine, I am sure we both slept the sweeter.

Came a lovely morning just twelve days after the first egg hatched, when, looking over the shade first thing as always, I found the nest empty and but one baby in sight, fully-feathered, balancing uncertainly on a twig and chirping lustily for his parents who were hysterically trying to follow the other four fledglings who were fluttering in four different directions.

There followed a few hectic days when we rescued them from perils, and kept the cats in durance, until the little wings grew more sure and the chirping voices sounded fainter as they drifted farther across the field toward the creek.

Lonely, the little nest swings as the summer breeze rocks the rose trellis, and a dead leaf in the empty cup that yet brims over with fond memories of the little brown birds' friendly confidence.

Owl Patrols Highway

Patrolling a highway alone is a lonely job at night, but Officer Ronald Faulkinham of Liberty, Maine, has a night-loving companion on his safety vigil. It is a great horned owl captured by a friend of the officer when he felled a tree in which the owl had a nest. The bird was stunned when it came down with the tree. Accepted into the Faulkinham family, the owl seems content with life with man, a contentment partly due to a regular diet of raw beef. The bird rides with the officer, is not restrained, and when not on duty is likely to go foraging into the night, returning home in the morning.

Reelfoot Report

Much material of interest to students of aquatic life is to be found in Volume III, January, 1939, of the report of the Reelfoot Lake Biological Station, Tennessee. One feature is a description of additional fishes found in the lake, together with a key to all the Reelfoot fishes, both reports being made by Dr. Clinton L. Baker, director of the station. Another interesting article, with illustrations, is that on the amphibians and reptiles of the lake and its vicinity by Malcolm V. Parker; and bird students will find Eva O. Gersbacher's discussion on the heronries of Reelfoot Lake of special interest. The report is published by the Tennessee Academy of Science, Nashville, Tennessee.

Starlings in Montana

After reading our suggestion that the starling be allowed at least to take out first citizenship papers, Louis Wessel of Great Falls, Montana, took his pen in hand to advise us that the starlings have taken up residence in his community and at Poplar, Montana, some 300 miles east. Mr. Wessel suggests that the birds may have made their way up the Missouri River by easy stages.

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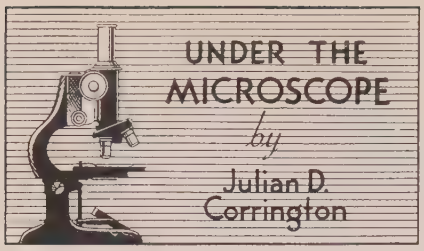

The Iron Hæmatoxylin Technique

In connection with the article on preparing stained mounts of desmids, in the June-July 1939 issue, the following technique notes were deferred through lack of space.

The most famous of all biological dyes is Haidenhain's Iron-Alum Hæmatoxylin, introduced by Benda in 1885-86 and by Haidenhain in 1892, and still retaining first place as a specific stain for chromosomes during mitosis, for the chromatin and nucleoli of resting nuclei, for striated muscle fibers and still other subjects, including such algae as desmids.

This stain is employed by the regressive method—that is, material is purposely overstained, then is destained (differentiated) to just the right amount of intensity before the bleaching action is checked. Two solutions are used and they may be kept in staining jars and used many times on different materials before they are at last worn out and have to be thrown away. Number one is a four percent aqueous solution of ferric alum (ammonio-ferric sulphate), while number two is a one-half percent solution of hæmatoxylin in distilled water.

These are best purchased ready for use, but if one prefers to make as many of his own reagents as possible, number two may be prepared as follows: dissolve the hæmatoxylin crystals in the distilled water and let stand for 10 days in a bottle closed with a plug of cotton. This is to facilitate ripening of the solution, which takes place by oxidation. Shake the bottle frequently and vigorously during this period. Let stand without shaking for a month longer or until a deep wine red color results, then store in a dark-colored bottle with a tight cork or, preferably, a glass-stoppered bottle. Keep in a cool and dark situation when not in use.

Desmids can be stained by decanting the last washing water from the vial of fixed concentrate and replacing for 3 hours with solution one, the ferric alum. This reagent acts here as a *mordant;* it does not impart a stain itself but prepares the material to receive the stain, which is the second solution, hæmatoxylin. After the mordant is carefully poured off and saved, replace with several changes of water over a 5-minute period, shaking the vial frequently. Then add the hæmatoxylin and allow to act for 24 hours, followed again by washing in several changes of water for 5 minutes or until the water ceases to show any color.

The desmids have been overstained and are now placed in the ferric alum again, the reagent this time acting to differentiate. No definite time of immersion can be stated, each operation in iron hæmatoxylin staining having to be determined for itself by inspection under the microscope. After half an hour, remove a very small drop containing the algae to a slide, add water and a cover glass, and examine under first low and then high power. Repeat this examination, as may be necessary, at 10-minute intervals, until inspection shows the material to be correctly stained as to intensity of the dye in the nuclei and pyrenoids, the stained structures standing out in sharp black-and-white contrast to the unstained portions. Fine detail should be brought out with great precision. When this time arrives, check the action of the ferric alum by washing in several changes of water over a half-hour period, then dehydrate through the alcohol series and clear in xylol, 5 minutes duration for each, finally mounting in balsam.

Another method is to apply a very thin film of Mayer's albumen fixative (March issue) to a clean slide, put on a drop of desmid concentrate, which has been fixed and washed, and allow to become nearly but not completely dry. When all excess water has evaporated but while the smear is still well moist, immerse the slide in a jar of ferric alum and continue as before, carrying the material through on the slide instead of in a vial, and shortening all times by one-half. If only a single slide is desired, this method is to be preferred.

Sectioned materials, as plant root-tips for mitosis or tongue for striated muscle are carried through this technique on slides in this same manner; about 30 minutes in solution one, 1 hour in number two. Control of differentiation is accomplished by removing slides from their second bath in ferric alum, rinsing for a moment in water, then mounting the slide for examination under the microscope, without using a cover glass, taking care to keep the section wet with water during the inspection. One soon learns to do this rapidly. Stop the action by transferring slides to water as soon as the staining is correct.

* * *

News and Notes

The New York Microscopical Society held its Sixty-second Annual Exhibition at the American Museum of Natural History in New York City on February 25, 1939. There were fourteen tables on which sixty-two individuals and two societies displayed well over one hundred slides, instruments and photographs. The President for this year is H. W. Zieler.

* * *

In the British publication *Photography* for April, 1939, appeared a two-page article that will interest all photomicrographic enthusiasts. *Pocket-Lens Photography,* by Dr. James Small, describes methods and includes four beautiful illustrations of a system of making photomicrographs through hand lenses of 1, 2, and 3 inch focal lengths. The field of view covered ranges, with these lenses, from ⅜ to 1½", magnifications varying according to degree of photographic enlargement. One British firm expects to place a commercial outfit of this nature on the market and has promised to notify us when ready, so we may pass on the word to you.

* * *

On April 20, Bausch & Lomb opened its Hall of Optical Science in the Museum of Science and Industry, R. C. A. Bldg., Radio City, New York, with distinguished guests from the fields of science, industry and government attending a luncheon given by company officials to celebrate the progress of science and to mark some of the particular contributions of optics.

In this Hall the dry laws of optics are transformed into dynamic displays of light, motion and color, making it easy for the observer to understand many of the principles that guide the lens designer and optical engineer in the construction of optical instruments. By merely pushing buttons and turning knobs visitors may see how different surfaces reflect, refract or disperse light. Sectional views of such instruments as binoculars and microscopes show mechanical features and the pathway of light rays.

There are dioramas, batteries of automatic projectors, revolving illusions and ten demonstration lectures daily, telling stories of manufacture or historical development. It is estimated that more than a million visitors to the New York World's Fair will visit the Hall of Optical Science during the year it is

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scheduled for operation. If you will be in New York this year, do not fail to see this marvelous and highly informational exhibit.

* * *

A notable experiment in science education is scheduled to get under way in July of this year, backed by a Carnegie grant and supported by an array of America's leading scientists from many fields. Philadelphia has been selected for the first test of this unique plan, but knowledge gained there will later be applied all over the country.

All museums, research and educational institutions, scientists and clubs in the Quaker City will be organized, and the greatest science educators in the country will be brought there for special lectures, the object being to bring science to the masses. The first period of discussions has as its subject "Science in Our Lives", while more advanced work will be offered in the fall. The plan is to have professionals work with, advise and consult with amateurs, and also to enlist the aid of amateurs in coöperating with research men. Microscopy is included among many other sciences. A monthly news letter of amateur science will be circulated. Dr. Edwin Grant Conklin, of Princeton, is chairman of the committee in charge.

* * *

Announcement has been made of the A. Cressy Morrison Prizes for 1939, consisting of two prizes of $200 each. All members of the New York Academy of Sciences or any of its affiliated societies are eligible to compete by submitting papers on science subjects. For detailed information address Frederick H. Pough, Secretary, The New York Academy of Sciences, Central Park West at 79th St., New York City.

* * *

A Handy Hot Plate

The following ingenious gadget for the microscopist has been contributed by Garry Weingarten, chemist at the Southern Laboratories, Huntington, W. Va. It often happens that electricity but no gas is available and the microscopist wishes something better as a burner than the relatively feeble alcohol lamp. For these and other circumstances, a serviceable hot plate can easily be made from a household cigarette lighter, plugged into the house current.

The most convenient type of lighter to secure is the one resembling a fuse and that can be screwed into a porcelain cleat receptacle. Some turn on and off by a switch and need no alteration. If only the kind that must be tilted to make contact is available, remove the brass collar and interior brass ball, substituting for the latter enough copper or brass discs to insure permanent contact, then operate by screwing and unscrewing into the receptacle, or introduce a snap switch.

If a second lighter is placed in series with the one to be used as a burner, the mechanically-inclined operator can so fix the second one as to control the amount of current to the burner and thus control its heating capacity. Or rig up a small ring stand with a clamped ring whose elevation above the burner can be altered, so that a slide or beaker can be brought closer to or farther away from the heat, as desired.

Mr. Weingarten writes that he has used such a device to evaporate drops on slides, evaporate solutions to dryness, and practically all other operations of the professional hot plate save fusions. He also finds there is a lessening of the danger of inflammability when volatile liquids are used with this hot plate rather than over an open flame.

* * *

Trade Notes

Allow us to introduce you this month to another British firm, Messrs. Flatters & Garnett, Ltd., 309, Oxford Road, Manchester, 13, England. They make microscopes and many other instruments, accessories and specialties, and carry a huge stock of biological preparations, slides and reagents—probably the largest listing of prepared slides in the world. Their American agent is the Arthur H. Thomas Company, West Washington Square, Philadelphia. Flatters & Garnett are the manufacturers of Euparal and a new Neutral Synthetic Mountant.

We have a supply of their Catalog H3 for distribution and you may obtain a copy by writing Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St. N.W., Washington, D. C., and enclosing a three-cent stamp.

* * *

Everyone interested in entomology will want a copy of *How to Know the Insects,* by H. E. Jaques, 709 N. Main, Mt. Pleasant, Iowa. Order from the author; spiral wire binding, $1.00; cloth, $1.80, postpaid. Within the 140 pages will be found a mine of condensed information on collecting and mounting, illustrated keys, references, hints to the teacher, the student or the collector, and lists of orders and families. The author writes with charm and authority and occasionally enlivens his material with an amusing cartoon in the modern style. We recommend this work highly, as we did his *Living Things, How to Know Them,* reviewed in the May, 1939, issue.

* * *

One of the best small books on technique we have seen is *Microscopic Objects—How to Mount Them,* by Jean C. Johnson; pages viii, 144; several zinc illustrations and a number of plates of good photomicrographs. The 14 chapters take up materials, formulæ and tables, and the preparation and mounting of insects, diatoms, crystals, rock and mineral sections, opaque objects, and the more usual biological sections and smears, along with many miscellaneous items. Our only criticism is that the index is far too brief and inadequate. Suited for both beginner and advanced student. Order from W. Watson & Sons, Ltd., 313, High Holborn, London, W. C. 1, England; 3/6.

* * *

Under the Microscope is a department of NATURE MAGAZINE designed for those readers interested in microscopy and maintains a service to render assistance with problems in this field. You are invited to take advantage of this service. Address all inquiries to Julian D. Corrington, NATURE MAGAZINE, 1214 Sixteenth St. N.W., Washington, D. C.

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Address all communications concerning the Society to Dr. Corrington at Chestertown, Md. Application for Membership form sent on request. Dues, one year, fifty cents; two years, one dollar. Nature and purpose of organization explained in October, 1938; installation announced in March, 1939, issue of *Nature Magazine*.

Our New Emblem

Well, Microfans, here it is—the newly-selected insignia of the newly-formed Society, and right proud we are of it, to be sure. It is most appropriate, and, to our way of thinking, one of the most beautiful devices of this nature we have ever seen. Dominated by a central microscope in silhouette, the left quadrant shows a tree to represent organic microscopy, while the right one has a large rock mass to symbolize the inorganic field. In the outer ring are the initial letters ASAM and the date of founding.

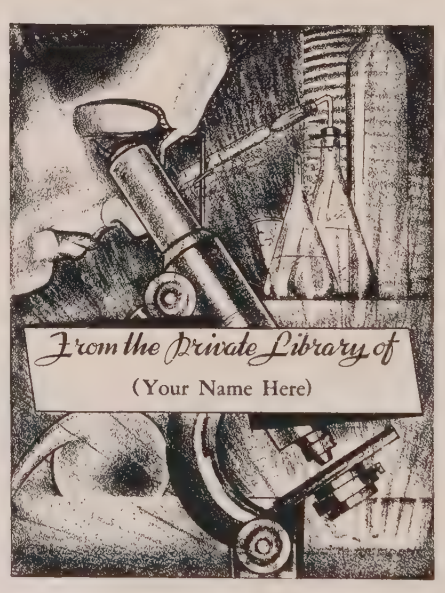
We wish you could all see the original drawing, twice the size of the copy here shown. It is superbly executed, the work of a professional artist who is one of our members, Mr. Herbert Meyer, of 1437 East 12th St., Brooklyn, New York. Ideas from which this emblem was selected came from several sources, as we had anticipated, Mr. Meyer and your Secretary contributing, but chief credit goes to John J. Ingalls, San Diego, California, who submitted three very fine insignia, one of which incorporated the central theme of a microscope flanked by two quadrants. Mr. Ingalls had a landscape with tree at the left and a factory at the right. Mr. Meyer tried a cross section of a tree in the left quadrant, a rock section in the right, then threw the drawing into the waste basket because, as he writes, "unless I told you what they were you couldn't even guess." Then he tried diatoms and other time-honored objects, finally deciding on the more simplified designs now adopted, since the finished emblem had to be artistically balanced and tied together, representative of the subject, clear to anyone, able to stand considerable reduction without loss of definition, and suitable for certificates, publication, letterheads or pins.

Our thanks to these gentlemen and to J. P. Gaehl, Standish, Michigan, and George Fox, Brooklyn, New York, who also submitted most attractive designs involving considerable labor.

We asked Mr. Meyer, who contributed the finished drawing without charge to the Society, to tell us something about himself and he replied that at one time he was art director for one of the largest film concerns in the East, but is now free-lancing in such diversified fields as box designing, magazine, newspaper, car cards and motion picture advertising. As a microscopist he has studied fungus growths on fishes and done some research with mites on reptiles. His aim in joining the Society was to find someone with whom he could work out problems.

Mr. Meyer was a member of the Greater Aquarium Society of Brooklyn and has won many awards in breeding and raising rare tropical fish, of which he has had as many as 3000 at one time. He sent us a number of very fine and most interesting photos of his collection of live reptiles and amphibia, his chief present hobby, including an engaging pose of the rare *Hyla andersonii* on a wine glass; snakes of many species, notably a large boa; alligators, turtles and lizards in great profusion. He also specializes in raising rare plants. No wonder that classes from a nearby school "visit my home in shifts of thirty at a time."

How About a Bookplate?



Shown herewith is a bookplate that will appeal to all microscopists and provide them with a most attractive and professional-looking embellishment for their private collection of books. It is executed in rich sepia brown on heavy gummed stock, and comes with your own name printed in, all ready to moisten and put right in your books, identifying them with an exclusive label symbolizing the endless research of the scientific field and the part that research has played in world progress.

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So that the Society can participate, the Secretary has agreed to handle all orders and send them to the publishers in bulk lots, which will be returned to him for distribution to purchasers. This will involve a slight delay while orders are accumulating, but nothing serious. Send check or money order with your order to Julian D. Corrington, 118 Water St., Chestertown, Maryland. No acknowledgments will be made, since this would mean more work and postage, but it is not anticipated that any difficulties will arise.

* * *

Among recent members are some who have established reputations in microscopy. W. E. Watson-Baker, Managing Director of W. Watson & Sons, Ltd., famous manufacturers of microscopes and optical equipment, London, England, is a Fellow of the Royal Microscopical Society and the Linnæan Society, President of the Quekett Microscopical Club and member of many other scientific societies in England and on the Continent.

Mr. Charles S. Foster is photomicrographer with the Eastman Kodak Company, Rochester, New York, and writes that he is enthusiastic about the ASAM, and whenever we need any help, "just holler."

The June, 1939, issue of *The Microscope and Entomological Monthly,* British publication previously reviewed in these columns, contains a very fine illustrated article by ASAM member William Byford, Toronto, Canada, on a new design for a homemade microscope lamp. For low powers and routine uses an ordinary 40-watt opal bulb is employed, while for high power and photomicrography an exciting lamp as used in sound motion picture projection provides an intense light source.

Amateurs of every stage, from rank beginners to those as advanced as any professional, cannot help deriving benefit from association in the same Society with men of the caliber of these and others to be mentioned in later issues. We can write them of special problems in their particular fields, ask for criticisms of our work, and from time to time they will doubtless contribute to our Bulletin or serve as officers.

* * *

Speaking of the Bulletin—as we write this under the waving palms of Miami, within sight of beautiful Biscayne Bay—the first number of the Bulletin is being mimeographed up there in Elkins, West Virginia, by member Boyers M. Clark, while across from him in Aberdeen, Maryland, member William Cronin is engaged in the perspiring task of hand-lettering the new Certificates of Membership. It's a job, folks, directing all this business by long distance, but in these cool tropical breezes, our sympathies must go to those mentioned above who are in the sweltering and torrid north.

* * *

The largest cells ever produced on earth are extinct. They were the yolks of dinosaur eggs, some of them as large as a man's head in all probability. The largest living cell is the ostrich egg yolk—nearly the size of a baseball.

Teaching Tolerance

The November issue of *The Teaching Biologist* is devoted to the scientific and educational aspects of anthropology. Dr. Franz Boas, dean of American anthropologists, and Dr. H. L. Shapiro, associate physical anthropologist of the American Museum of Natural History, as well as a group of high school biology teachers, have prepared articles for this issue. The entire magazine will deal with the problem of race and show how biology can promote tolerance. It will contain an outline of a teaching unit on mankind, and will suggest socially significant subject matter, activities, methodology, testing procedure and bibliography. The edition will be limited, so those interested are urged to get in touch with William Shulman, business manager for the New York Association of Biology Teachers, 60 Clarkson Avenue, Brooklyn, New York. Single copies of the magazine sell for twenty-five cents.

Squirrel, Mouse and Company

In *The Chisel-tooth Tribe,* Wilfred S. Bronsen has given us a treatment of this interesting group that seems to be the best we have seen. It starts out with some general characteristics, has chapters on tree squirrels and ground squirrels, goes on to prairie dogs and beavers, and when we have pranced through the delightful accounts of the rodents belonging to several other groups we find that we have learned most of the more interesting facts about the more notable gnawers of the four or more corners of the earth.

To one who has read so many pages about the many kinds of rodents that have been measured and classified and named in this and other countries, and how many millions' worth of grain and other food stuffs they eat, and how many tons of poison it takes each year to keep them from eating us out of house and home, and what a debt we owe to those wise people who thus save our lives, it has been a keen pleasure to read this delightful book, in which none of these features are elaborated. In its 200 pages we learn painlessly of the home life of our little wild neighbors. A careful reading should convince anyone that all the chisel-toothed clan are a part of Nature's plan to populate the earth, part of a great interlocking system in which all benefit each other in some degree. Even we ourselves are a part of it, for rabbits have become an important part of our food, even in the present stage of our civilization, just as they were in the days of early man.

The Chisel-tooth Tribe is published by Harcourt, Brace and Company at $2.00. E. A. P.

Texas Ferns

Those interested in ferns will enjoy an attractive little booklet by Elsie McElroy Slater entitled *Thirteen Ferns of The Mexican Border.* The immediate region concerned is the vicinity of El Paso, Texas. After an interesting introduction, the author gives an equally interesting and careful discussion of this baker's dozen ferns. Drawings supplement the text. This little fifty-six page, paper-bound booklet is available from the author at 516 Prospect Avenue, El Paso, Texas, for seventy-five cents.

Idaho Mammals

The latest addition to state lists of mammals of our Northwest is *The Recent Mammals of Idaho* by William B. Davis of the Museum of Vertebrate Zoology at Berkeley, California.

Idaho's extensive range in altitude, temperature and humidity, affords a great variety of habitat types, and one hundred and forty-one forms of mammals have been detected within its borders. Of these all but a few species are still reasonably common; a few of the larger and more valuable species have been reduced dangerously, or perhaps entirely extirpated. All species are treated in more or less detail in this book of four hundred pages.

The entire work shows scholarship of a high class. The geology, geography, floral areas, and climate, the interesting effects of which permit the existence of so rich a fauna, and provide the factors that determine their distribution, are treated in a logical and masterly manner. If one misses some of the wealth of detail on seasonal habits that marks certain state lists, he is repaid by the fuller discussion of distributional areas, the detailed account of type localities (with map), and the gazetteer of localities. Forty-three forms have been described from localities within the state, three of which date from the present volume. There is an extensive list of literature cited, and a good index.

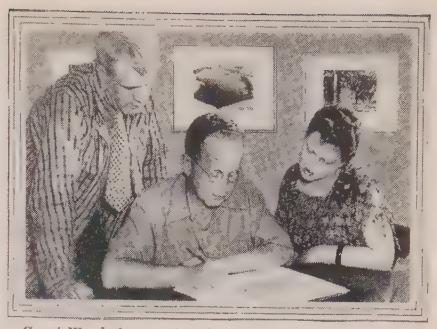
To the Caxton Printers of Caldwell, Idaho, are due the thanks of all interested students of mammalogy for undertaking and carrying out so ably the task of printing a book that involves so much attention to detail as a list of this character. Teachers of biology, foresters, game officials, sportsmen and students of natural history generally, not only in Idaho but in neighboring states, will find the work invaluable. It may be obtained from the publishers for $5.00, a price that we fear involves a loss to its makers. E. A. P.

Forestry

An Introduction to American Forestry by Shirley W. Allen of the School of Forestry and Conservation of the University of Michigan is a general text for the beginning students of forestry. It is a book that will, of course, be valuable in forestry schools, and also should be found in the libraries of C.C.C. camps. It is published by McGraw-Hill and sells for $3.50.

A New Edition

First published in 1929, *Botany,* by William J. Robins and Harold W. Rickett, was brought out in a second edition in 1934 and now appears in a third edition. This is, of course, a splendid botany text for college and university students, brought up to the minute in the present volume and continuing the general rearrangement of treatment inaugurated in the second edition. Published by D. Van Nostrand Company, the book lists at $3.75.



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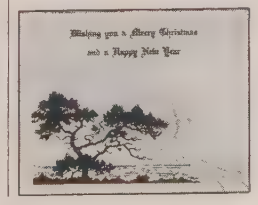

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Camera Trails

BY NORRIS W. HARKNESS

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We are happy to announce the 1940 Camera Trails Contest to find the finest Nature pictures made by amateur photographers.

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Any amateur photographer may enter as many pictures as desired, and they may be either contact prints or enlargements, but not larger than eight by ten inches. They should be unmounted. The only requirement is that every entry must have the photographer's name plainly written or stamped on the back of the print. Prints cannot be returned, and we cannot enter into correspondence with regard to individual prints.

Prints will be judged equally for their pictorial value and Nature interest.

Send entries to Norris W. Harkness, 320 East 42nd Street, New York City.

A STUDY OF A COMMON TERN'S NEST THAT MAKES A FINE PICTURE AS WELL. BY F. SEYMOUR HERSEY, EXHIBITED AT THE ZEISS ANNUAL EXHIBITION

A Suggestion

A year or two ago we began a series of pictures that is giving us a most useful exercise of skill and imagination, and that will—we hope—result some day in a really worthwhile story. We began it in black and white, but have now supplemented those shots with color, and the progress is satisfying and pleasant. It is the story of a full year in a small garden, with a complete history of each month's activity from the spring preparation of the ground and the planting of the annuals, through the growing and harvest seasons and the sleep of winter, to the melting of the last snow and the return of the birds. Our pictures are concerned not only with the plants and flowers, but also with the birds and the small mammals, and even with the destructive insects, which seem more popular with us than with the owner of the garden. We have made shots from the same spot in early morning, high noon, and with the last light of sunset, and in every month of the year, in an attempt at a sort of overall index to the more detailed life of smaller parts, and we have followed one particular flower from its first breaking through the ground to the fall of its last seed. Only a few of the original pictures remain in the collection, for most of them have been replaced by later and more successful efforts, and it is this that sometimes makes us wonder if it will ever be really finished. But if it isn't, it won't matter. The pictures themselves and the story they tell would be worth the effort even if their making had not in itself been real fun.

This idea of a series of pictures to tell a whole story clearly and in perfect detail can be applied to innumerable phases of Nature photography. We might do the "Life of a Frog", or of any other familiar friend, or of a favorite flower or plant. It doesn't matter that it has been done before or that some one else is working on the same subject. Our viewpoint and opportunities will differ from theirs, and it is probable that our whole approach will vary so much from that of our competitor that our results can scarcely be thought to conflict. He makes all his shots indoors, or strives only for strict naturalist's accuracy, while we shoot some of ours in the field and try to make each one a combination that will appeal to both the botanist or biologist and the pictorialist. He may show his series as a book full of prints, while we do ours as slides and project them on a screen. Truly, here is a project that we can make entirely our own by the exercise of all the imagination and artistry we possess, and we can go back and make retakes until we have each shot just as it ought to be.

There are several things we ought to keep in mind as we select our subject. It should be near our headquarters so that we can make frequent visits to it. If possible, we should choose something that can be shot in various stages of its life on the same day by using, for example, both eggs and tadpoles and even frogs as models on the same trip. We should be able to include enough of our subject's surroundings to give a true setting to our picture, and yet most of our shots will probably need to be close-ups that will omit no details. And, most important, we should work with a definite plan but one that is sufficiently flexible to permit of changes when they are warranted, and then do every step of the process to the best of our ability. Both the doing and the results will be valued and valuable.

If any of our readers have made such series

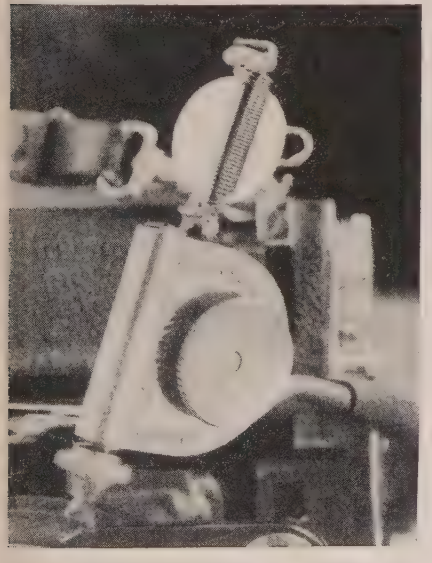
—or do make them in the future—we would enjoy hearing about the procedure and the results.

Remote Control

Often the location of the den or nest makes it impossible for us to hide near enough to make our picture of the owner when he returns, and, indeed, our presence will usually keep him away from home. To get the natural

kind of shot we want, then, it becomes necessary for us to arrange some sort of device with which we can stay far enough from the spot to keep from frightening our subject and yet be able to fire the camera at the right time and get a close-up of him.

A sufficiently long cable release is out of the question for most of us and, to the best of our knowledge, there is no other firing



device available on the market. So we make our own. As shown in the accompanying picture, it consists of one of the small plunger releases that can be bought for a dime in the photographic stores, a spring to force the plunger into the cable release socket in the shutter, and a disc to hold the plunger out until we are ready to make the shot. We soldered short lengths of copper wire to the end of the plunger and to the base of the release (the part that screws into the shutter) and used the wire to hold the spring, which

(Continued on page 536)

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Indoors and Out

By HOWARD ZAHNISER

TITIAN RAMSAY PEALE seems to be coming close to becoming the forgotten naturalist of the United States. Having never succeeded in writing a book widely circulated, or in becoming the subject of such a work, he apparently has shared the fate of all those who miss the perpetuating influences of the printed word. The one hundred and fortieth anniversary of his birth on the seventeenth of November seems to be a fitting occasion for a remembrance of his services to early American natural history and of the significant associations in his career.

This career began with great promise. For one thing, Titian Ramsay Peale was the son of Charles Willson Peale and the half-brother of those still-remembered namesakes of the great painters—Rembrandt, Rubens, and Raphael Peale. It was not surprising that Titian developed a talent as an illustrator. He inherited also influences that were, to say the least, kindly for one interested in natural history. Fifteen years before Titian's birth, Charles Willson Peale had started the famous museum that bore the family name —a museum that was outstanding in the world in its day as a repository of important natural-history specimens, among them those used in the description of many new forms of life by Alexander Wilson, George Ord, Charles Lucien Bonaparte, Thomas Say, and other notables. Add to these the associations with the great naturalists themselves and the concurrent opportunities for exploration, and one has what seems to be an ideal environment for a prospective naturalist.

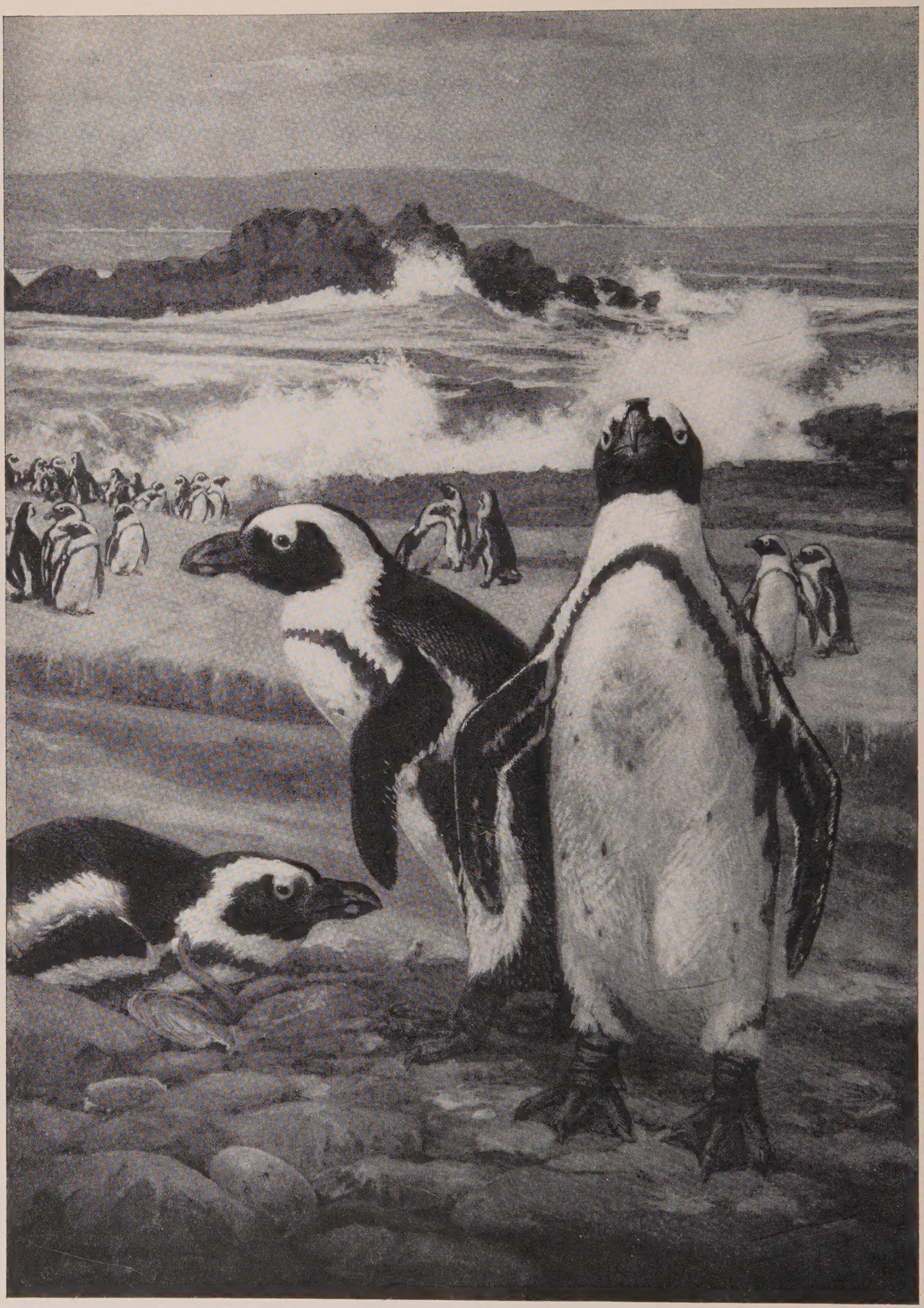
As a matter of fact, it could hardly be said that Titian Ramsay Peale failed to realize his expectations in any way but this one: He left no enduring contributions to the literature. Had he done this he would doubtless still be sharing our green laurels. Perhaps this failure is not altogether his own fault, for he seems at a critical time in his career as a naturalist to have been the victim of professional jealousy and of other circumstances beyond his control. A sketch of his biography—such as that in the *American Dictionary of Biography* or that in *Cassinia* for 1915 by Witmer Stone—is interesting not only in itself but also in connection with several significant developments—those of museums, of exploration, of illustrative art, as well as that of natural history.

When he was only 19, Titian Ramsay Peale accompanied George Ord, Thomas Say, and William Maclure on an expedition to Georgia and Florida. The next year he went as assistant naturalist on Major Stephen H. Long's expedition to the Rocky Mountains and was one of the party that first ascended Pike's Peak. Major Long's orders said that Peale's "services will be required in collecting specimens suitable to be presented, in drafting and delineating them, in preserving the skins, &c. of animals, and in sketching the stratifications of rocks, earths, &c. as presented on the declivities of precipices." He made 122 sketches, 21 of them finished and the rest in outline. Major Long in his report said that the young Peale "was active and industrious in the collection and preservation of such rare specimens of animals, &c. as came under our observation." (Major Long seems to have had a fondness for ampersands!) In 1824 Peale collected in Florida for Charles Lucien Bonaparte. In 1832 he explored in the interior of Colombia in South America. The climax of his career as an explorer came from 1838 to 1842 when he was a member of the United States Exploring Expedition under Charles Wilkes, but from the experiences that resulted from his work for this expedition came also what may have been the frustration of his career as a naturalist.

During these years already sketched Peale had also been earning a reputation as an artist. As early as 1822 he had exhibited water-colors of animals, and in 1826 he had such an exhibition at the Pennsylvania Academy of Fine Arts. He made several large oil paintings from his sketches on the Long Expedition—paintings of buffaloes, moose, and Rocky Mountain sheep. Of more importance is his work as an illustrator. He did 28 of the 54 illustrations in color for Thomas Say's famous three-volume *American Entomology* published from 1824 to 1828, and himself colored the plates in the original work. The color plates in two volumes (I and IV) of Bonaparte's *American Ornithology* were by Peale, and there were other calls for his services as an illustrator. Bonaparte said: "I have been solicitous to procure the best representations of my birds . . . A better choice could not have been made than that of Mr. Peale."

During all these years Peale was also closely associated with the family museum, later called the Philadelphia Museum. In 1833 he became the manager of the institution and its lecturer on natural history, a service that continued, with only the Exploring Expedition interruption (1838-42), until the museum's financial condition after the United States Bank failure forced its sale to P. T. Barnum and Moses Kimball, in 1846. This experience with the museum suggests a tempting digression, for Peale's Museum not only was an interesting place but also is significant in its influence on the development of the great institutions of today. For example, it was first in exhibiting specimens with a painted background of their environment—the forerunner of the habitat groups that now fairly transport one to the outdoors. But the story of the museum can better wait for another page. When it failed Titian Ramsay Peale's active associations with natural history were nearing their end.

They "might have been" just reaching their fruition. These "sad words" are suggested by the circumstances surrounding the publication of Peale's one book—circumstances viewed, however, nearly a century later by one who is unable to obtain all the facts. In 1848 Peale's *Mammalia and Ornithology* was published as Volume VIII of the reports on the Wilkes Expedition. It is remarkable now because of its rarity (there are (Continued on page 536)



"THEIR DIMINUTIVE DIGNITY AND ALOOFNESS ASSISTED THEIR BEADY LITTLE EYES IN CREATING THE IMPRESSION OF SUPERIORITY OVER US FEATHERLESS BIPEDS"

(Reproduced from a painting by R. Bruce Horsfall)